



# FLOOD HAZARD NEWS

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## Storm Water Quality To Be Monitored

by Bill Alley

The quality of streams draining urbanized areas such as Metropolitan Denver is of major concern to the inhabitants of such an area. Water quality problems can become quite severe in urban areas as a result of dense population and numerous industrial operations.

Up to the present time, primary focus has been directed towards domestic and industrial waste and other point sources of pollution. In recent years, less obvious water pollution sources have been demonstrated to be of significance in water quality degradation. Storm water runoff is one such source. To realize this, one has only to observe the amount of litter, animal droppings, grease, gasoline, oil, etc., which collect on urban surfaces until a storm washes them off to a tributary channel. The large percentage of imperviousness associated with urban areas expedites this process of pollutant washoff.

Section 208 of the Federal Pollution Control Act, Amendments of 1972, Public Law 92-500, requires the development and implementation of a plan for a coordinated waste-treatment management system. If treatment of storm water runoff is to be properly addressed, basic data are needed to permit determination of the magnitude and type of pollution caused by storm water runoff. In an effort to contribute to this required data base, three local catchments are being monitored for synchronized rainfall, stream discharge, chemical quality, and microbiological data.

The U.S. Geological Survey, Water Resources Division is providing all necessary equipment and personnel in cooperation with the Urban Drainage and Flood Control District and the Denver Board of Water Commissioners for two of the drainages and the Denver Regional Council of Governments for the third drainage.

The principle objectives of this study are as follows:

- 1) To provide data to improve knowledge of the types, concentration, and behavior of dissolved and suspended material in storm water runoff in the Denver Metropolitan Area;
- 2) To provide information to evaluate the need for treatment, effectiveness of various types and degrees of treatment, and cost effectiveness of treatment;
- 3) To provide to the extent practicable, data to calibrate storm water quality and quantity models;
- 4) To evaluate the impact of urban storm water runoff on the quality of the South Platte River and its local tributaries, as well as minor gulches in the area; and

- 5) To provide data on both quantity and quality of storm water runoff as a basis for a more complete study of the feasibility of the use of urban storm water runoff as a potential municipal water supply.

The three catchments to be monitored are a 613-acre, single-unit residential area, a 60-acre multi-unit residential area, and a 2246-acre catchment in downtown Denver. The single-unit residential area is in Littleton, and the drainage flows into Big Dry Creek one quarter mile north-east of Arapahoe Road. The multi-family residential area borders the west side of the Denver Federal Center along 6th Avenue. The downtown area to be studied is much of the area bounded by Cheesman Park, Broadway, York Street, and East 40th.

The monitoring equipment automatically measures runoff and collects water quality samples when specified discharges are exceeded. The time interval between samplings can be set at 1 to 60 minutes. Samples collected will be analyzed for BOD, DOC, SOC, ammonia, organic nitrogen, nitrate, dissolved phosphorus, total orthophosphate, dissolved-solids concentration, specific conductance, volatile suspended solids, sodium, calcium, chloride, sulphate, coliform, and fecal coliform. Additional samples will be obtained quarterly for analyses of selected pesticidal compounds, and the following minor elements: mercury, arsenic, lead, cadmium, chromium, and iron. Suspended sediment data will be collected for at least two of the basins.

The study began as of May, 1975 and will continue until May, 1978, at which time a final interpretive report will be delivered to the cooperators. A basic-data report will be published by November 1, 1977. Data will be formatted to the extent possible for use in model calibration. Monitoring began in March, 1976.

### ABOUT THE AUTHOR . . .

*Bill Alley is presently working for the District on a special project involving evaluation of urban runoff models. He will be using the data collected from the above monitoring program as part of this evaluation.*

*Bill received a B.S. in Geological Engineering from the Colorado School of Mines and a M.S. degree from Stanford University. He has previously worked for the District during the summer of 1974 on a special project drafting a proposed research program on on-site detention of stormwater runoff.*

# DENVER'S PLATTE RIVER GREENWAY PROJECT: PROGRESS REPORT—MAY, 1976

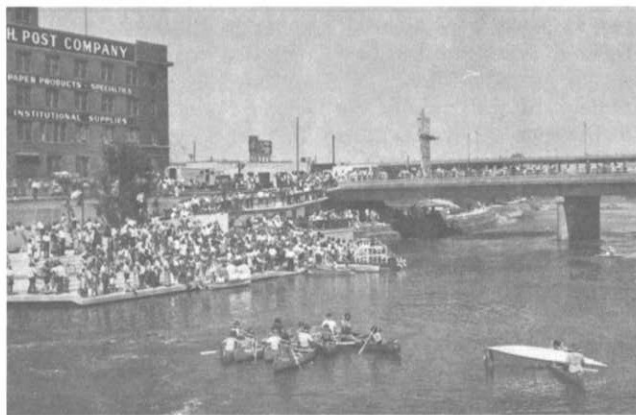
by Robert Searns, Rick Lamoreaux,  
Project Coordinators—PRDC

## The Greenway Project

Over the past twenty-three months, the City of Denver has been involved in an ambitious program to restore its reach of the South Platte River. The effort—directed by the Platte River Development Committee, a special Mayor's task force charged with revitalizing the city's neglected Platte Valley area—was initiated with the proposed development of a ten-mile Greenway corridor ultimately to encompass some 736 acres of river-oriented open space. The plan includes parks, picnic areas, boating facilities and feature areas all linked by a ten-mile system of hike/bike trails.

## Progress to Date

As of January, 1976, two initial segments of the Greenway have been completed. "Confluence Park," located at the Platte's confluence with Cherry Creek, just north of Speer Boulevard, includes a one-mile segment of hike/bike trail, a natural grass amphitheater, and a



Confluence Park dedication — Labor Day, 1975

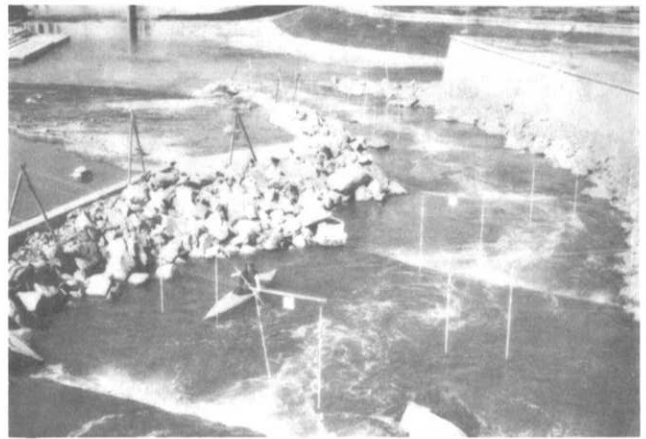
large brick riverfront plaza. Confluence Park also features a man-made competition kayak chute. The "North Segment" extends from 38th Street, near the Denver Coliseum, to 50th Avenue. It has a newly landscaped park and picnic area, boating facilities, and an additional one-mile segment of trail.

A third segment of the Greenway, extending from 8th to Colfax Avenues, went under construction in March of 1976. This segment will feature trails, viewing decks, and a quiet water boating area north of 13th Avenue.

Connecting into this segment will be improvements to Weir and Lakewood Gulches. Working in cooperation with the Urban Drainage District, these improvements will combine flood control and recreational functions. Improvements to Weir Gulch, expected to begin in June, include an architecturally designed flood channel serving as an attractive boating lagoon and a landscaped picnic area in the adjacent flood plain. Lakewood Gulch will feature a trail connection to Rude Park along with cleaning of the channel for flood control purposes. Work on Lakewood Gulch is expected to be underway by mid-summer.

## Upcoming Projects

Connecting trail segments from 38th to 19th streets, Speer to Colfax, and 8th Avenue to Alameda are in the final design stages. Scheduled for completion by January



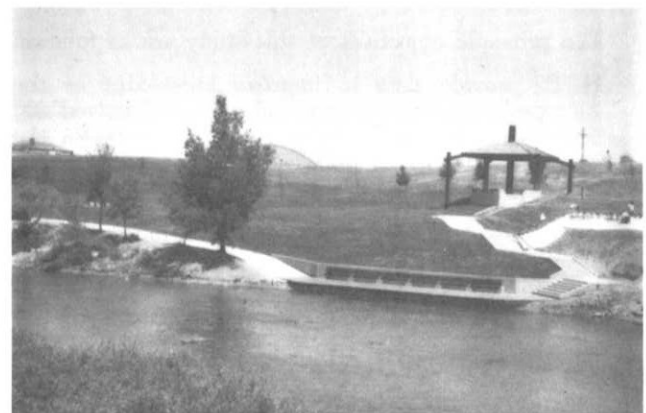
Competition kayak chute at Confluence Park

of 1977, these projects will tie together a continuous, six-mile, 200-acre Greenway corridor running from Valverde Park at Alameda Avenue to the north city limit. In addition to the connecting trail segments, two new river-front parks will be developed—a 1.9-acre park just south of Speer Boulevard, and a five-acre park at 8th Avenue. Recent grants from the Federal Bureau of Outdoor Recreation, the Federal Highway Administration and the Community Development Assistance Act will provide most of the \$1.5 million needed for these segments. Additional funding is now being sought to complete the remaining three miles of trail between Alameda and the south city limit at West Harvard Gulch. Prospects for this funding look very encouraging, and a completion date of September, 1977 has been set for the entire ten-mile corridor.

## The Future

The Greenway improvements are just a beginning. Longer range plans include a new, 200-acre park in the vicinity of the Platte's confluence with Cherry Creek along with additional river landscaping and cleanup citywide. In cooperation with Littleton, Englewood and Adams County, a more extensive river Greenway is envisioned running the length of the South Platte through the metropolitan area. It will provide trail access to the new Chatfield recreation area, Clear Creek, and the Cherry Creek recreation area.

The Greenway, as it develops, will hopefully become a focal point for the Denver metropolitan area. It will be a showcase of river restoration and a reminder of the once-beautiful Platte River Valley that existed here not many generations ago.



The North Segment feature area includes a picnic shelter, boat launch area and trails.

## Planning, Design & Construction Notes

by

**Brian S. Kolstad**  
District Civil Engineer

Multi-use flood control projects are becoming commonplace rather than unusual projects. This is due in part to the scarcity of land available for recreation in urban areas. The usual concept of a multi-use flood control project is a grass lined channel with a hiker-biker trail.

Two projects of interest which go beyond this greenbelt approach are Weir Gulch at its confluence with the South Platte River, and Englewood Dam on Willow Creek, upstream of Little Dry Creek. The Master Plan for Weir Gulch called for the typical grass lined channel to transition to a concrete lined channel to enable the water to pass through an existing railroad bridge. Since the South Platte River, on the other side of the bridge, was getting special treatment, it was suggested by the Platte River Development Committee that the gulch project be expanded to compliment the South Platte River project. The result will be a park complex with a small boat launch to be used by those wishing to kayak and canoe on the Platte.

The channel will be widened such that the 100-year flood plain will cover the park. The concrete channel is still needed to pass the lesser frequency floods and help in the widening of 9th Avenue. However, by the use of special forms, the impact of the concrete will be minimized. The trail system through the park will include a wood deck which will be used as the boat launching platform. Weir Gulch will be lowered in this area to allow the Platte River to flow in to the gulch to provide a constant water level in the lagoon. A drop structure will be used to take up the gulch gradient and provide a waterfall backdrop to the lagoon. Landscaping will be provided in the park to further add to the acceptance of the multi-use flood control channel.

Englewood Dam was originally constructed in the 1930's. Due to increasing flood hazards, the dam was raised 10 feet and a grass lined spillway was added in 1975. The spillway and dam height combination is sized to pass the flood generated from the probable maximum precipitation. However, the spillway would not be used for floods of less than a 300-year frequency. The spillway is about 300 feet wide. The housing in the surrounding area is relatively new and without recreational facilities. The District received a request from South Suburban Parks and Recreation District to allow installation of softball diamonds and football and soccer fields on a portion of the spillway which is virtually flat.

A portion of the spillway was cut into the side of an existing hill. This would be a logical place for grandstands. Backstops and goal posts could be oriented so as not to catch debris and obstruct flow. Concession stands, parking, restrooms, etc., could be located out of any high hazard areas and still close enough for their use. Lighting of the fields poses some concern at this time. However, it is felt something can be worked out. The District is now waiting for more detailed information on the recreational complex request from South Suburban Parks and Recreation District.

These two examples show how flood control facilities can have other uses. One example was planned with multi-use concepts in mind, while the second is a matter of taking advantage of an existing facility. These projects demonstrate that we are bound only by the limits of our imagination.

## Flood Insurance Status As Of February 29, 1976

Entity	Amount of Insurance In Thousands of Dollars	Number of Policies
Adams County	905	31
Arapahoe County	994	27
Arvada	10,330	222
Aurora	3,849	135
Boulder	9,652	302
Boulder County	2,017	65
Brighton	60	3
Broomfield	417	13
Cherry Hills Village	867	24
Columbine Valley	305	8
Commerce City	2,535	16
Denver	21,207	676
Douglas County	1,388	14
Edgewater	173	8
Englewood	2,615	66
Golden	142	5
Jefferson County	2,446	82
Lakewood	5,707	164
Littleton	2,773	78
Louisville	270	17
Morrison	45	1
Northglenn	169	6
Sheridan	941	44
Thornton	22	1
Westminster	251	12
Wheat Ridge	4,892	158

## District Sponsored Project Wins Award

Leonard Rice Consulting Water Engineers, Inc., with offices in Denver and Granby, Colorado, received two of the five Engineering Excellence Awards presented by the Consulting Engineers Council of Colorado at the 1976 Annual Awards Banquet. The two awards were for research leading to a benefit cost analysis procedure and a Drainage Management Plan prepared for Albuquerque, New Mexico.

The research was sponsored by Colorado State University and funded in part by the federal office of Water Research and Technology and the Urban Drainage and Flood Control District. Completed in July 1975, the project produced a procedure for evaluating urban drainage and flood control projects which has already been applied to projects exceeding \$18,000,000 in estimated construction cost. Dr. Norman A. Evans, Director of the Environmental Resource Center of CSU, said the project was an unusually fine example of cooperative research on a highly priority problem combining the expertise and special abilities of academic, government and consultant participants.

Colorado State Senator, W. Joseph Shoemaker, an expert in drainage law, served as legal and legislative consultant to the project and was instrumental in the enactment of a Bill by the 1975 Legislature that defined, for the first time, the benefits derived from urban drainage improvements (*Flood Hazard News*, February, 1975). The Act incorporated engineering definition of benefits developed by the project team. Leonard Rice, President of LRCWE, Inc., said that the definition of urban drainage benefits will make it easier for local governments to finance and implement urban drainage projects.

Other winners in the 1976 competition were Chen and Associates for "Correction of Structural Defects in a School Building, Caused by Swelling Soils," Wright-McLaughlin

(Continued on Page 5)

# Tucker-Talk

by L. SCOTT TUCKER

*Timely Comment from the District's Executive Director*



## **PLANNING PROJECT COMPLETED FOR PORTION OF HIGHLINE CANAL**

Flood control master planning was completed for the Highline Canal for a reach from Lee Gulch to Little Dry Creek in Arapahoe County. The planning was undertaken by the District in cooperation with the Denver Water Board. The firm of Leonard Rice Consulting Water Engineers, Inc. was the engineer for the study which was completed in November, 1975.

The District's Board accepted the master plan and recommended its use as a guide for planning at their March, 1976 meeting. The basic elements of the master plan are:

1. Provide flow separation structures at Little Dry Creek, Slaughterhouse Gulch, and Big Dry Creek.
2. Provide curbs and gutters on some street bridges to permit drainage flows to proceed across the canal.
3. Identify areas of potential accidental canal spills.
4. Identify areas where intentional spill areas could be located.

The portion of the canal studied flows through Greenwood Village, Littleton, and unincorporated areas of Arapahoe County. These three local governments have been requested to use the master plan in the evaluation of future development proposals that either affect the canal, or are affected by the canal. Because of the serious drainage problem that already exists, future developments should not be allowed to discharge runoff into the Highline Canal.

## **STORM WATER QUALITY**

Many metropolitan areas in the United States are engaged in regional water quality planning through Section 208 of Public Law 92-500, the Nation's basic water quality legislation. Planning under Section 208 is 100% financed by the Environmental Protection Agency.

Unlike previous water quality planning, Section 208 planning must evaluate the effects of non-point sources on the quality of the receiving waters. One significant non-point source is urban storm water runoff.

Intuitively, it is concluded that urban storm water adversely affects the quality of receiving waters. This intuitive conclusion has been borne out by limited field verification in some areas of the United States; however, very limited storm water quality data is available in the Denver region to substantiate this conclusion.

In my opinion, it would be a serious error in judgment to come to any firm conclusions with regard to addressing the alleged storm water pollution problem until adequate regional data is available. Structural means of treating storm water are very expensive and the need for such treatment must be clearly demonstrated. Non-structural techniques of addressing the storm water pollution problem, which include street sweeping and on-sight detention, have also been suggested. No data is presently available to demonstrate the effectiveness of

these non-structural approaches. It would seem unwise to commit ourselves to non-structural solutions until their effect can be clearly demonstrated.

The problem must be clearly identified before conclusions are reached. A cooperative project has been initiated in the Denver area between the U.S. Geological Survey, the Denver Water Board, the Denver Regional Council of Governments, and the Urban Drainage and Flood Control District to develop basic data for problem definition (see cover article). Hopefully, the 208 planning will not commit the Denver region to storm water pollution abatement measures that are based on a spurious data base.

## **BOB McWHINNIE LEAVES THE DENVER WATER BOARD**

Bob McWhinnie was chairman of the District's Technical Advisory Committee since its inception in 1970. The Technical Advisory Committee provided invaluable assistance to the Board of Directors in the formative years of the District. Much of the contribution of the Technical Advisory Committee can be attributed directly to Bob.

Bob was Mr. Waterboard to many of us in the Denver area. In March, 1976, Bob resigned from the Water Board to accept a position as President and Chief Executive Officer in Denver for the United Research Services, formally Ken R. White Company, an engineering-architectural consulting firm. Bob will be missed as a public servant, but, fortunately, he is still in the Denver area where we can all get at him.

## **JOINT EFFORT INITIATED TO IMPROVE MAPLE GROVE RESERVOIR**

Jefferson County, Wheat Ridge, Lakewood, and the Urban Drainage and Flood Control District are considering participation in improvements to Maple Grove Reservoir. The reservoir is owned by Consolidated Mutual Water Company which has been directed by the State Engineer to improve the spillway to pass the Standard Project Flood. The basis for the local entity involvement is to reduce the discharges from the reservoir up through the 100-year flood to the minimum.

The four local entities are considering a total initial participation of \$70,000 plus ownership and maintenance responsibilities of a portion of the spillway constructed for flood control purposes. The District's initial contribution would be a maximum of \$35,000, Wheat Ridge and Jefferson County a maximum of \$13,215, and Lakewood a maximum of \$8,750.

Negotiations are now underway with Consolidated Mutual and the local entities regarding the improvements. The goal is to complete the improvements before the Spring runoffs of 1977.

## **A PORTION OF THE SANDERSON GULCH PROJECT IS COMPLETED**

The Sanderson Gulch construction project involving Denver and Lakewood was initiated in 1973. The final design was completed in early 1974. Because of the

(Continued on Page 5)

(Continued from Page 4)

complexity of the project, it was divided into five separate construction packages. The first construction package, initiated in Lakewood on North Sanderson Gulch in February, 1975, is now complete. The final construction cost of North Sanderson Gulch was about \$2,000 less than the bid amount. Construction has also been initiated on a reach in Denver, extending from Arkansas Street upstream to Sheridan Boulevard, and a reach in Lakewood extending from Wadsworth Boulevard upstream to include Kendrick Reservoir. The remaining two construction packages are scheduled for construction in 1976.

Total project cost of the Sanderson Gulch improvements is now estimated to be \$2,850,000. The cost of the project is being shared by the District, Denver, Lakewood, Department of Housing and Urban Development, and the State of Colorado.

#### **BIDS OPENED ON LOWER WEIR GULCH**

The District and Denver are participating in a joint effort to improve Weir Gulch from Bryant Street downstream to the Platte River. Design has been completed and bids were opened on the project in early April. The low bid was \$230,387.27 and the high bid was \$324,534.50. The engineer estimated the cost would be \$335,000.

In addition to flood control improvements, a boating lagoon will be constructed to tie in with improvements to the Platte River. The non-flood control aspects of the project are being financed by Denver's Platte River Development Committee. This project is an excellent example of multi-purpose efforts and we are gratified to be getting the construction underway.

#### **BENEFIT-COST REPORT AVAILABLE**

Techniques for evaluating minor and major urban drainage and flood control projects are described in a report entitled, "Urban Drainage and Flood Control Projects; Economic, Legal and Financial Aspects," completed in July, 1975. The report was the result of a joint effort between the Urban Drainage and Flood Control District and Colorado State University. Participants in the effort included Neil Grigg, Associate Professor of Civil Engineering at Colorado State University; Leslie Botham and Lee Rice of Leonard Rice Consulting Water Engineers of Denver; W. J. Shoemaker, Attorney and Colorado State Senator; and myself. The report addresses the general economic evaluation problem for urban drainage and flood control projects, the measurement of tangible benefits of urban drainage and flood control projects, the evaluation of minor and major urban drainage and flood control systems, case study of a benefit/cost analysis for comparing project cost and flood damage reduction benefits, and an evaluation of social and environmental benefits. Copies of the report can be obtained from the Urban Drainage and Flood Control District.

#### **NEW BOARD MEMBERS**

The Governor recently appointed three new directors to the District's Board. They are Mayor Vi June of Westminster, Mayor Walt Spader of Broomfield, and Mayor Fred Hood of Aurora. The Board is fortunate to have members of their quality and we all look forward to working with them. Congratulations and welcome aboard!

#### **NEW BOARD OFFICERS ELECTED IN FEBRUARY**

The Board of Directors held their annual meeting on February 2, 1976. The prime order of business at the annual meeting is the election of officers. The new officers consist of Mayor James Richey of Lakewood as Chairman, Commissioner Wally Toevs of Boulder County as Chair-



Improvements on one reach of North Sanderson Gulch consist of a grass lined channel, concrete low flow channel and gabion drop structures.

man Pro Tem, Councilwoman Cathy Reynolds of Denver as Secretary, and Councilman Kenneth MacIntosh of Denver as Treasurer. John Nicholl, Commissioner of Arapahoe County and former Chairman of the Board, is the fifth member of the District's Executive Committee.

#### **HOLLY DAM PROJECT HELD UP**

Plans and specifications were completed for Holly Dam in May, 1975 by the firm of McCall-Ellingson & Morrill. Construction, however, has not been initiated because right-of-way cannot be obtained. The developer of the area, SMS Ventures, Inc., was to dedicate the land needed for the construction of Holly Dam to the District per the planned unit development arrangements approved by the Arapahoe County Commissioners. The developer, however, has refused to transfer the land to the District pending the rezoning of other lands in the immediate area.

Holly Dam is to be constructed with the monies remaining after the construction of improvements to Englewood Dam. A fixed sum of money is available and unless construction can be initiated in the relatively near future, the funds available may become inadequate because of inflation.

Hopefully, the right-of-way needed to construct the facility can be obtained in time to initiate the construction and complete the facility before the Spring of 1977.

#### **AGREEMENT REACHED WITH DENVER ON A SECOND REACH OF WEIR GULCH**

The District and Denver have agreed to implement drainage improvements on Weir Gulch extending from Alameda Avenue downstream to Perry Street. This will constitute the second construction package on Weir Gulch.

The estimated construction cost is \$1,030,000. Right-of-way is now being acquired and construction bids can be let as soon as the right-of-way is obtained. As with other projects in the City and County of Denver, Denver will administrate the contract and provide the necessary construction supervision and inspection.

(Continued from Page 3)

Engineers for "South Platte River Improvement Project" (see article on South Platte River elsewhere in this issue), and Ketchum-Konkel-Barrett-Nickel-Austin for "Roof Over the Stadium at University of Idaho." This project has also been named as the Outstanding Civil Engineering Achievement of 1976 by the American Society of Civil Engineers.

The  
URBAN  DRAINAGE  
&  
FLOOD CONTROL DISTRICT

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Management Program

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FLOOD HAZARD NEWS  
Bill DeGroot, Editor

**FLOOD PLAIN MANAGEMENT**  
**Developing a Program**

by BILL DeGROOT

ADMINISTRATOR FLOOD PLAIN MANAGEMENT PROGRAM

*FLOOD PLAIN REGULATIONS ADOPTED*

In the last issue of *Flood Hazard News*, I reported that the Board of Directors had adopted a policy requiring 28 local governments to adopt adequate flood plain regulations before the end of 1975. The policy further stated that the District would enforce its regulation in those communities not meeting this requirement.

I am pleased to report that all 28 jurisdictions have adopted adequate regulations. The Board believes that flood plains should be regulated at the local level and is gratified that all local governments have accepted this responsibility.

*BOARD CONSIDERS PROBLEM OF WARNING  
FLOOD PLAIN OCCUPANTS*

Beginning with the publication of a Flood Plain Information report on the South Platte River in 1963 by the Corps of Engineers, a large amount of flood hazard information has been developed for the Denver area by the Corps and the District. One of the most perplexing problems facing the District has been how to get this flood hazard information out to the individual flood plain owner and/or occupant.

At the present time, flood hazard information is disseminated through local flood plain regulation programs and the National Flood Insurance Program. As a part of their flood plain regulation efforts, local governments must hold public hearings designating flood plains for regulation. If these public hearings are heavily publicized they can be effective in notifying owners and/or occupants. However, the effects of notification can wear off fairly rapidly.

The National Flood Insurance Program can be effective in alerting potential buyers of structures in flood plains of the flood hazard. To date, flood insurance maps (either Flood Hazard Boundary Maps or Flood Insurance Rate Maps) have been published for 30 local governments in the District. Federal regulations require that all structures located in flood hazard areas purchased with federally regulated money carry flood insurance. This requirement serves to alert potential occupants of flood hazards. However, the present program does not necessarily alert present owners (unless refinancing is sought), renters, or purchasers of raw land.

At its March meeting, the Board advised all local governments within the District area of the flood hazard information that is available within each jurisdiction, and that such information should be made available to flood plain owners and/or occupants. Two possible methods of notification were suggested.

One procedure would involve publication of notice of public hearing, a letter to each flood plain occupant advising them of the public hearing, the holding of a public hearing, and the recording of the flood plain delineation with the county clerk and recorder. The second procedure would be the publication of maps in a newspaper of general circulation. We are presently investigating the feasibility (including cost) of both procedures.

The Board's concern is two-fold. First, it feels an obligation to inform flood plain owners and occupants of flood hazards so they can take proper precautions, the

(Continued on Page 7)

least of which would be to obtain flood insurance. Secondly, a potential liability may exist when a flood occurs and the information had not been made available to the owners/occupants.

#### FLOOD HAZARD AREA DELINEATION

In early 1974, the District began a program of flood hazard area delineation. The purpose of this program is to define 100-year flood plains along drainageways which are essentially undeveloped. These flood plain delineations can then be utilized by local governments in their preventive flood plain management programs. Hopefully, this effort will allow us to guide new development along these drainageways to prevent an increase in flood damage potential and the need for future expensive remedial actions.

Our first effort was to define the flood plain along 3.1 miles of Boulder Creek and 6.2 miles along Dry Creek in Boulder County. Consulting engineer for this project was Leonard Rice Consulting Water Engineers, Inc. (LRCWE). The study was completed in June of 1975.

Our second study resulted in the delineation of approximately 70 miles of flood plains along Second and Third Creeks in Adams County and Cottonwood, Lone Tree, Murphy and Piney Creeks in Arapahoe and Douglas Counties. This effort was unique in that we "piggy-backed" a Federal Insurance Administration flood insurance study being completed by Gingery Associates, Inc. (GAI). The majority of the flood plains along these creeks were being defined in an approximate manner for the flood insurance study. The District, in cooperation with the Colorado Water Conservation Board (CWCB), provided detailed mapping of the study areas and paid the additional costs necessary to upgrade the studies from approximate to detailed efforts. This project was completed in February, 1976.

Other efforts underway include 17 miles of Upper Cherry Creek (in cooperation with the Corps of Engineers, CWCB, and Arapahoe and Douglas Counties), 19 miles of Sand Creek (in cooperation with the Corps), 20 miles of Rock and Coal Creeks (in cooperation with the Soil Conservation Service, CWCB, Boulder and Weld Counties and the Coal Creek Water Users Association), 17 miles of the South Platte River in Adams County (in cooperation with CWCB and Adams County), 10 miles of the South Platte River (in cooperation with the Corps of Engineers and CWCB) and 7 miles along Weaver Creek (in cooperation with CWCB).

The project on the South Platte River in Adams County is another "piggy-back" effort. We hope to initiate more of these studies as more flood insurance studies are begun.

## Flood Insurance Claims Tripled in 1975

Carla Hills, Secretary of Housing and Urban Development, released on January 29, 1976, figures showing that flood insurance claims payments in 1975 exceeded \$72 million, three times the amount paid in the previous year.

The biggest single cause of loss in 1975 was Hurricane Eloise, which ravaged the East Coast in September.

Illustrating the impressive growth of the National Flood Insurance Program Secretary Hills said flood insurance policy sales went up 40 percent in 1975 over the previous year. The total amount of coverage in force, she said, increased by nearly 45 percent, going from \$12½ billion in 1974 to more than \$18 billion in 1975.

Year-end figures for the National Flood Insurance Program, prepared under the direction of HUD's Acting Federal Insurance Administrator, J. Robert Hunter, show that the number of communities participating in the program more than doubled—growing from 5,488 in 1974 to 13,256 in 1975.

Mr. Hunter said the advent of Hurricane Eloise gave the FIA and the National Flood Insurers Association (NFIA) an opportunity for comparison with Tropical Storm Agnes, which hit the same part of the country in 1972.

In one of the nation's most flood-prone states, Pennsylvania, the flood insurance program had its most astonishing growth: from about 683 policies in the entire Commonwealth at the time of Tropical Storm Agnes to more than 40,180 policies when Hurricane Eloise struck.

"I am delighted," Mr. Hunter said, "that about one-third of the families and businesses hit by Eloise were indemnified for flood damage under the National Flood Insurance Program against less than one-percent following Agnes."

The program, heavily subsidized by the Federal Government, offers low-cost insurance protection to property owners under policies issued by the NFIA which provide payment for damage from flooding in communities that qualify. Any licensed agent or broker can place flood insurance for citizens in participating communities.

#### NATIONAL FLOOD INSURANCE PROGRAM YEAR END TOTALS

	1974	1975
Communities Participating	5,488	13,256
Insurance Policies in Force (estimate)	49,300	690,000
Coverage (Billion)	\$12.5	\$18.3
Claims Paid	3,283	17,524
Claims Paid (Million)	\$21	\$72.1

### FLOOD INSURANCE EXPERIENCE

Agnes (1972) vs Eloise (1975)

State	Flood Damage		No. of Flood Ins. Policies in Force		No. of Flood Ins. Claims Filed		Insurance Indemnification for Flood Damage	
	Agnes	Eloise	Agnes	Eloise	Agnes	Eloise	Agnes	Eloise
Pennsylvania	\$410,060,000	\$112,800,000	683	40,180	146	8,000	\$ 772,260	\$37,500,000
Virginia	69,650,000	6,000,000	667	9,224	209	450	1,601,354	4,200,000
New York	41,385,000	27,420,000	2,046	25,121	7	1,650	35,000	2,438,000
Maryland	15,000,000	8,000,000	693	5,610	99	600	733,933	2,900,000
Florida	11,207,000	20,000,000	21,208	128,051	1,019	500	1,778,659	2,000,000
New Jersey	8,112,000	1,500,000	9,259	41,069	107	375	90,511	562,000
Connecticut	3,000,000	2,000,000	115	4,875	8	150	40,000	1,200,000
Total	569,741,000	228,780,000	61,228	258,744	1,614	12,375	5,146,717	58,000,000

Source: National Flood Insurers Association Insurance Experience and the American Insurance Association Property Claim Services

## Meet the New Board Members

**FRED HOOD**  
Mayor, Aurora

Fred Hood grew up in Norman, Oklahoma, where one of his friends was James Bumgardner, now known as James Garner. He has a BS in Business Administration from the University of Northern Colorado, and is presently working on his Masters Degree in Public Administration.

Mayor Hood retired from the Air Force in 1972 after 22 years and 7 months of service. He is currently employed as a Management Analyst and Consultant for the federal government.

Among his many activities, he is a Senior Member of the American Institute of Industrial Engineers, President of the Aurora Community Development Corporation, and a Board Member of the Aurora East Gate Lions Club.



**VI JUNE**  
Mayor, Westminster

Vi June was first elected to the Westminster City Council in 1965. She was re-elected in 1969, and served as Mayor Pro-Tem for two years prior to being elected Mayor in 1975.

She worked for ten years as a newspaper reporter, including four years as community editor for the Sentinel Newspapers. She is currently public information officer for School District 50 in Westminster.

Mayor June received the Liberty Bell award at the annual Law Day Breakfast on April 30. The award is given to an Adams County resident who demonstrated outstanding community service.

Vi June is married and the mother of five children ranging in age from 14 to 21.



**WALTER P. SPADER**  
Mayor, Broomfield

Walt Spader was born and raised in Elizabeth, New Jersey. Prior to moving to Broomfield in 1969, he served as a member of the Jackson, N.J. Planning Board and member and President of the Jackson Board of Education.

In 1972, he was President of the Broomfield Jaycees. He was elected to the Broomfield City Council in 1974. He was elected to a two-year term as Mayor in November, 1975.

Mayor Spader is currently Supervisor of Computer Center Operations for Bell Labs-Denver. He and his wife Barbara, have three children.



**JAMES COVEY**  
Commissioner, Adams County

James Covey is a full-time commissioner and is presently Chairman of the Adams County Board of County Commissioners. He is a member of the Board of Directors of the North Washington Water and Sanitation District and the Denver Metropolitan Sewage Disposal District.

He has worked as an Assistant Superintendent for Stearns Roger Engineering Construction Co., field engineer for the Rio Grande Railroad, and field engineer for Carter Oil Company.

Commissioner Covey has been active in the Adams County Democratic Party for ten years. He is married and has four children.





**CATHY REYNOLDS**  
Councilman-at-large, Denver

Cathy Reynolds was born in Kansas City, Kansas. She graduated from high school in Shawnee, Kansas and attended the University of Kansas from 1962 to 1964. She is married and has two sons.

Mrs. Reynolds is a member of the Democratic Party, Denver Jane-Jefferson Club, League of Women Voters, and a board member of the Denver Democratic Women's Caucus. She began her first term as a Denver Councilman on July 1, 1975.



M. L. "SAM" SANDOS



Sam Sandos is also serving his first term on the Denver City Council. He received his college education at Colorado State University. His work experience includes positions as Deputy Director - Denver Opportunity, member of President's Council on Youth Opportunity, Mayor's Assistant for Youth Affairs, Director - Public Service Careers, and Executive Director of SER/JOBS FOR PROGRESS, INC.

Councilman Sandos is currently Assistant Director of Services and Director of Manpower for the State of Colorado. He is married and the father of nine children.



## STATUS OF DISTRICT CONSTRUCTION PROJECTS

Project	Participating Jurisdictions	Cost	Status
Englewood Dam	Englewood, Cherry Hills Village, Greenwood Village, Arapahoe County, CWCB	\$550,000	Complete
Lower Niver Channel	Adams Co., CWCB, Federal Disaster Assistance Administration	439,500	Complete
Holly Dam	Englewood, Cherry Hills Village, Greenwood Village, Arapahoe County	450,000	Design Complete. Held up with ROW problems.
Viele Channel	Boulder, Boulder County, CWCB	527,000	Under construction - completion scheduled for June 30, 1976.
Sanderson Gulch	Denver, Lakewood, HUD, CWCB	2,850,000	North Sanderson Gulch in Lakewood complete. Sanderson Gulch from Wadsworth to Kendrick Lake in Lakewood and from Arkansas to Sheridan in Denver under construction. Remainder scheduled for construction by end of 1976.
Weir Gulch	Denver, Lakewood, CWCB	3,195,000	Design 60% complete. Reach from Bryant to South Platte construction to begin about June 15. Construction on reach from Alameda to Perry to be bid in July.
Lena Gulch at 32nd Avenue	Wheat Ridge, Colorado Highway Dept.	150,000	In final design
Maple Grove Reservoir	Wheat Ridge, Lakewood, Jefferson County, Consolidated Mutual Water Company	700,000	Negotiations in progress
Niver Detention	Thornton, Adams County, CWCB	965,400	Negotiations in progress
Globeville Drainage	Denver	800,000	Final design complete

## Timely and Available

## Some Current Publications

### *Urban Storm Drainage Criteria Manual*

Originally published by the Denver Regional Council of Governments under a grant from HUD, the manual was completed under the direction of Wright-McLaughlin Engineers and involved contributions from regional engineers and nationally recognized hydrologists.

The two volume manual, which is over 800 pages long, covers engineering data as well as the policy and philosophy necessary to understand and cope with urban drainage problems.

The cost of the manual is \$45.00 plus \$2.00 for postage and handling.

### *Urban Drainage and Flood Control Projects - Economic, Legal and Financial Aspects*

This publication is the result of a two-year research project co-sponsored by the District. Included in the report are techniques for evaluating minor and major urban drainage and flood control projects, measurement of tangible benefits, methods for establishing the relative ranking of intangible benefits, recent state legislation defining benefits, and information on the estimation of flood damages and the selection of discount rates.

A limited number of copies are available. Please enclose \$.50 for postage and handling. Limit one.

### *Reorientation of Urban Water Resources Research*

This report covers the findings and recommendations of a workshop sponsored by the Universities' Council on Water Resources and the Urban Water Resources Research Council of the American Society of Civil Engineers. The workshop was held at Quail Roost, N.C. in July, 1975. A limited number of copies of both the full report and an executive summary are available. Limit one. Please enclose \$.50 for postage and handling.

### *Proceedings of Seminar on Flood Plain Management*

This report contains the edited transcripts of a two-day seminar sponsored by the District in November, 1974. Topics covered include Flood Damage Mitigation, Past, Present, and Future; Approaches to a Complete Flood Plain Management Program; The National Flood Insurance Program; Using Flood Plains for Recreation and Open Space, and Flood Plain Regulations.

The cost of the proceedings is \$5.50 including postage and handling.

### *Activity Summary*

This 14-page report outlines current activities of the Urban Drainage and Flood Control District, including flood plain management, flood hazard area delineation, master planning, and construction.

Please enclose \$.50 for postage and handling.

THE URBAN DRAINAGE AND FLOOD CONTROL DISTRICT  
Silco Oil Building, 181 East 56th Avenue  
Denver, Colorado 80216

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