FLOOD HAZARD NEWS

Vol. 2, No. 3 November, 1972

THE URBAN DRAINAGE AND FLOOD CONTROL DISTRICT

Lucas Building, 181 East 56th Avenue, Denver, Colorado 80216. Telephone: (303) 534-0105

Stormwater Detention in Denver Region Reviewed at Seminar

A seminar was held in Denver on September 14 on stormwater detention. From 20 to 25 people were in attendance at the day-long seminar. The Urban Drainage District, along with the Colorado section of the American Public Works Association, co-sponsored the seminar.

The seminar was in response to efforts by Herb Poertner, project director of a Federally sponsored research project on stormwater detention. The seminar provided timely inputs to Mr. Poertner's research efforts, in addition to airing the problems and potentials of stormwater detention in the Denver region.

Several persons presented concepts and ideas to the attendees which was followed by lively discussion in each case. Those leading discussions were Joe Shoemaker, Attorney for the District and State Senator; Thomas Grimshaw, Attorney; Ted Dieffenderfer, Director of Operations for Boulder; Horace Smith, Director of Wastewater Control Services for Denver; Bill Lorah, engineer, Wright-McLaughlin Engineers; Lee Rice, Consultant to the District; Elmer Claycomb, engineer, Frasier & Gingery, Inc.; and Al Barnes, Associate Professor at Colorado State University.

Subjects discussed at the seminar included legislation and legislative needs for on-site detention; legal and administrative aspects of on-site detention; implementation and enforcement; design, costs, and benefits of stormwater detention; and procedures for evaluating the potential effectiveness of proposed detention facilities.

The discussion included two basic approaches which might be used for implementing a regional stormwater detention plan. One is a volunteer approach, whereby the Drainage District could develop a model stormwater detention resolution and then encourage and assist local jurisdictions in adopting and enforcing similar resolutions. With the other method, the District or local governments would be required to develop and enforce stormwater detention ordinances.

LEGAL QUESTIONS RAISED

Several legal questions were brought out during the seminar. Does an upstream owner have an obligation to restrict runoff to historical rates, or can he discharge additional waters downstream due to his development with no associated responsibility? Does a land owner have an obligation to retain a drainage facility on his property that has served a flood control purpose in the past? Or can he destroy that facility and develop the property however he may wish? Also, what kind of restraints are involved with the construction of a drainage facility and who should assume it? These are questions that have yet to be settled but are very important in the overall drainage management concept.

It was made clear at the seminar that implementation of stormwater detention in terms of facilities appears relatively easy. However, knowledge and experience about enforcement, maintenance, and long-term effectiveness often is lacking. Uniform application of stormwater detention throughout a region is not necessarily the answer. There are both costs and benefits in stormwater detention, and each situation has to be evaluated independently and a judgment made as to its effectiveness.

The effects of stormwater detention immediately downstream from a facility are obvious. Since we are talking about detention as opposed to retention, the total volumes of runoff will remain essentially the same. The large scale effects of randomly implemented detention is an unknown factor, and at the present time there is no way to consider the effects of detention on the hydrology of a major drainageway. On this subject research is needed.

Quality of runoff water is also a factor that should be considered in connection with stormwater problems. Stormwater detention facilities might offer some advantages when it becomes necessary to treat all stormwater runoff.

It also became apparent during the seminar that the hydrological regime of a region is an important consideration. What works in Chicago will not necessarily work in Denver, because of the vast difference in annual rainfall. Also, water rights are an important consideration in the Denver region, particularly if detention is being considered. In the eastern United States, water rights are not an issue and consequently, need not enter into considerations of stormwater retention or detention.—S.T.

New Subdivision Regulations Restrict Land Use by Potential Developers

Senate Bill 35, the "Land Use" Bill, requires more data and more planning to be done by potential developers before land under their control can be made available for multiple owners.

S.B. 35 also applies the same standards to all lands which comprise less than 35 acres (whether or not for multiple owners).

The Subdivision Regulations of all counties after September 1, 1972, shall require, among other things, that the potential subdivider submit information as to the estimated construction cost and method of financing storm drainage facilities.

Additionally, "standards and technical procedures applicable to storm drainage plans and related designs, in order to insure proper drainage ways" is required.

Much more detailed "surveys, data, studies, and plans" are required for water, sanitary sewer, and soil purposes.

In view of the advancement in technology of drainage engineering, it would seem advisable that the Legislation be amended to require the same standards for drainage as for water and sewer.

MEET THE BOARD MEMBERS

J. IVANHOE ROSENBERG
City of Denver

RICHARD C. MC LEAN
City of Boulder

KENNETH MC INTOSH
City of Denver

KENNETH MACINTOSH
City of Denver

Councilman MacIntosh is a Denver attorney who was graduated from East Denver High School, the University of Denver and the Law School of the University of Denver. He is a member of the National League of Cities Committee on Environmental Control. He has served as an enforcement attorney for the Office of Price Administration, and as Assistant Attorney General for the State of Colorado. He began his law career as a clerk for the late Justice Henry Lindsley, and worked as a clerk in the state district court.

He is a retired Navy Lieutenant-Commander, and an Elder in the Montview Boulevard Presbyterian Church. Councilman MacIntosh is married and has three children. A daughter who graduated from the University of Denver is married. One son is a senior at Colorado State University, and the MacIntosh's other son is now serving as a Lieutenant with the Army infantry in Germany.

J. IVANHOE ROSENBERG
City of Denver

Ivan Rosenberg, a Denver City Councilman, long has been known as a civic leader, and as a seasoned campaigner for public improvements. He is editor and publisher of the Herald-Dispatch, Barnum's newspaper, founded by his father. His family is credited with many improvements in his part of Denver including parks, a branch library, freeway fences, and protection of property from floods along dangerous creeks and gulches.

Moving to city-wide and statewide responsibilities, Councilman Rosenberg has shown vigor and imagination on many major committees and boards, for which he has received a number of awards and citations.

Ivan and his wife, Shirley, have six children, the youngest of which attends Colorado University. Three of his sons work in the family publishing business, which employs 15 people.

RICHARD C. MC LEAN
City of Boulder

Mayor McLean is a lawyer educated at the University of Colorado and Stanford University. Since being admitted to the Colorado Bar in 1958 he has been a law clerk to a judge of the U. S. Court of Appeals. and a visiting lecturer of the University of Colorado School of Law. He was Chairman of the Boulder County Democratic Party, 1965-66, and a member of the Boulder City Council, 1970-1974. He was elected mayor of Boulder for the 1972-1974 term. He is a member of the law firm of Sheldon, Bayer, McLean & Glasman with offices in the American National Bank Building, Denver.

Mayor McLean is married and has two children. He is determined to keep his community at the forefront in civic affairs and to work for increased protection from the hazards of flash floods and for wiser use of flood plains.

THE URBAN DRAINAGE AND FLOOD CONTROL DISTRICT

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FLOOD HAZARD NEWS
Henry W. Hough, *Editor*

Map Shows Progress and Information Sources

Drainage studies have been or are being made on several streams and gulches in the Denver area. These studies are discussed below and are located on the map presented on the following pages.

FLOOD PLAIN INFORMATION STUDY INDEX

During the past ten years the Corps of Engineers, U.S. Army, has conducted scientific studies and issued Flood Plain Information Reports with maps, in cooperation with local agencies. In this region, the Urban Drainage and Flood Control District, as representative of the counties and municipalities in the Denver Area, acts as Coordinator of the program. The status of the Corps of Engineers flood plain studies in the region is shown on the map.

The general purpose of the Flood Plain Information Reports is to publicise available information on past floods, flood potentials and flood hazard areas for the guidance of state and local agencies as well as private citizens and interests. The reports are published to encourage the optimum and prudent use of the stream valleys and to help prevent improper flood plain development that otherwise might occur due to inadequate information.

FLOOD PLAIN INFORMATION REPORTS

MAP NO.	TITLE
1	South Platte River, Vol. 1, Oct., 1963
2	Sand, Toll Gate & Lower Cherry Creeks, Vol. II, April, 1964, rev. July, 1971
3	Bear & Clear Creeks, Vol. III, Jan. 1966
4	Big Dry, Little Dry Creeks, Greenwood, Weir, Lakewood, McIntyre Gulches, Little Dry (Adams) & Grange Hall Creeks, Vol. IV, Oct. Oct., 1968
5	Lefthand Creek, Vol. 1, Jan., 1969
6	Boulder & South Boulder Creeks, Vol. II, Aug., 1969
7	Ralston, Leyden, Van Bibber Creeks, Lena, Sanderson, & No. Sanderson Gulches, Vol. V, Nov., 1970
8	Goldsmith Gulch, Dutch Creek, Lilley Gulch & Coon Creek, Vol. VI, Nov. 1970
9	Bear & Mount Vernon Creeks, Morrison, Oct., 1971
10	Boulder Creek, City of Boulder, May, 1972
11	Lower St. Vrain Creek, Boulder County, Vol. III, June, 1972

DISTRICT DRAINAGE MASTER PLANNING

Each year the Urban Drainage District sponsors drainage master planning in cooperation with interested local agencies. Gulches and streams are selected on the basis of flood damage potential and priorities are assigned by the concerned jurisdictions in cooperation with the District.

For each study, the District provides topographic maps of the flood plain, generally at the scale of 1" = 100-ft. with 2-ft contours. The District also assists in selecting a consulting engineer and pays one-half of the engineering costs.

Master Plans are engineering studies which include plan and profile drawings showing (to scale) the plans of principal drainage works, with typical channel cross-sections, and controlling elevations and dimensions for bridges, culverts and other structures. Also defined, in enough detail for flood plain regulation purposes, are the general limits of the flood plain under existing conditions and as modified by the proposed improvements. Supporting data include hydrologic and hydraulic studies, documentation of the functional status of the basins for existing and assumed future conditions, definition of major drainage concepts, analysis of environmental impact, and legal analysis of proposed solutions.

The Master Plans are of two types, preventive and design. Preventive master planning is applicable to those areas where flood plain regulation, land use control and other essentially preventive actions can be applied with maximum effectiveness. By providing a definition of channel requirements and flood plain limits, it is possible through application of a preventive master plan to guide development of an area in a manner consistent with the natural major drainage system. In this way the responsibility for providing adequate channel and structures is placed on those developing the area.

Design master planning is applicable to areas where problems exist to the extent that facilities construction is required. In those cases, design master planning provides the information necessary to define and select a major drainage concept, and to prepare engineering cost estimates of principal features of the plan. Final design drawings and specifications can be prepared if and when the plan is approved, and construction contracts can be awarded.

Drainage master plans have been completed for certain of the drainage basins, and those are listed below:

MASTER PLANS COMPLETED
(as of October, 1972)

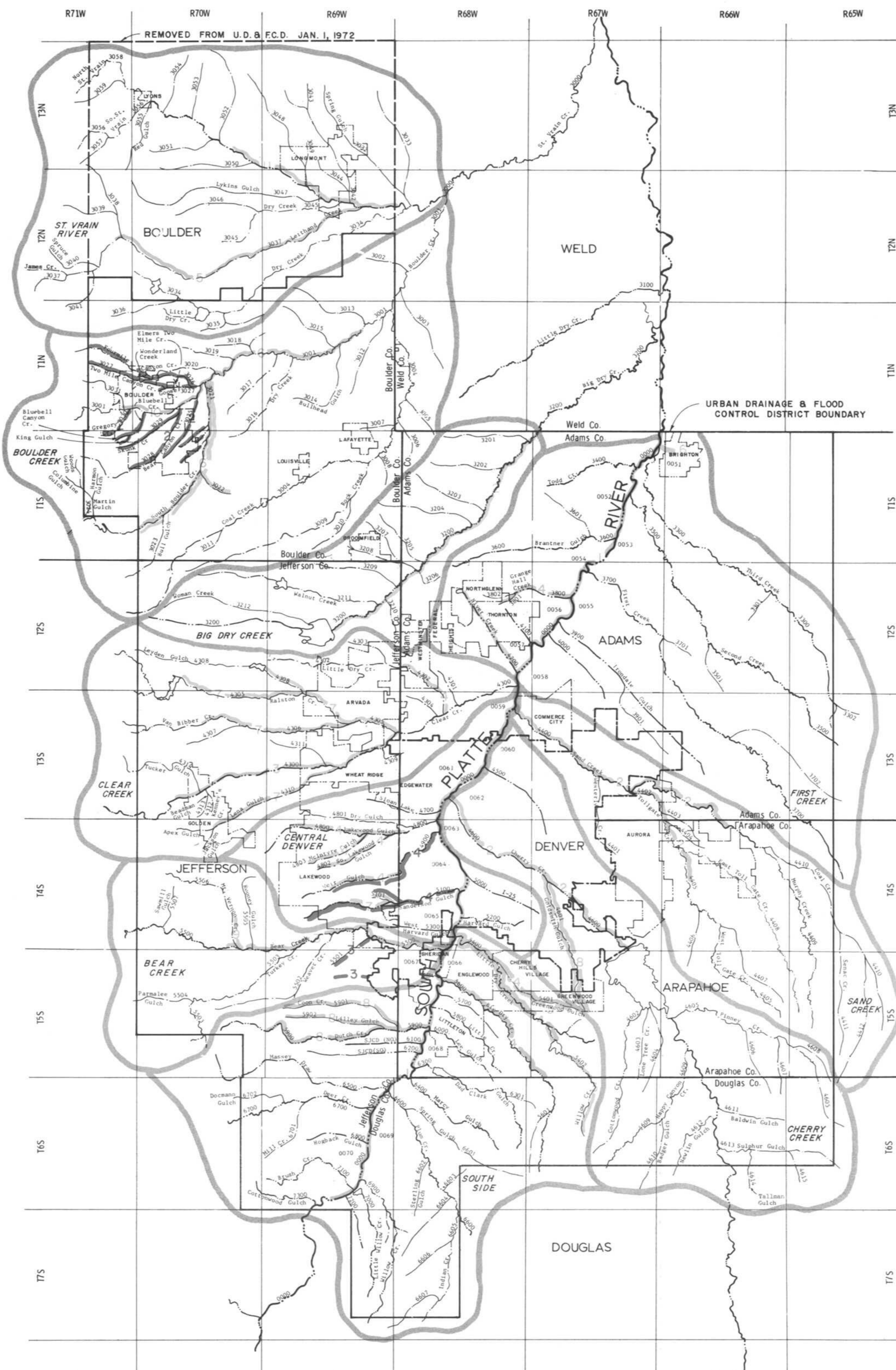
MAP NO.	TITLE
1	North Boulder Major Drainageways, April, 1969
2	South Boulder Major Drainageways, Sept., 1970
3	Henry's Lake, October, 1971
4	Weir, Sanderson and North Sanderson Gulches, 1972

MASTER PLANS UNDERWAY

The Urban Drainage and Flood Control District is currently working with local jurisdictions in developing master plans on several major drainageways in the Denver Region. These projects are listed below and are located on the map.

MAP NO.	TITLE
1	South Boulder Creek and Marshall Gulch
2	Big Dry Creek (Adams County)
3	Little Dry and Willow Creeks and Greenwood Gulch
4	*Goldsmith Gulch
5	*Niver Creek
6	*Brighton

*Negotiations with engineer and local jurisdiction in process.



LEGEND

PLANNING BASIN BOUNDARY	
PLANNING BASIN NAME	CHERRY CREEK
FLOOD PLAIN INFORMATION STUDIES	4
MASTER PLANS COMPLETED	3
MASTER PLANS UNDERWAY	2

NOTE: Number corresponds to index on reverse side.

1 0 5
Scale of Miles

URBAN DRAINAGE AND FLOOD CONTROL DISTRICT

REGIONAL MAJOR DRAINAGE SYSTEM

LEONARD RICE Consulting Water Engineers denver, colorado

SEPTEMBER, 1972

The Danger from Floods in the Denver Area

Like other sections of the semi-arid high plains area, Denver and nearby localities are confronted with danger from flash floods. Intense rainfalls or cloudbursts frequently result in tremendous runoffs in creeks and gulches that normally carry little or no water.

Costly experience with damaging floods has resulted in the development of agencies and programs designed to identify flood prone locations, and to minimize danger or damage.

The Urban Drainage and Flood Control District

In the Denver region, primary responsibility for coordinating multi-jurisdictional urban drainage activities is vested in the Urban Drainage and Flood Control District. Created in 1969 by an act of the Colorado State Legislature, the Urban Drainage District includes all of Denver County and parts of Adams, Arapahoe, Jefferson, Boulder and Douglas Counties . The UDFCD acts as a coordinating agency for the collection and dissemination of drainage information, flood plain definition, and assistance in qualifying for flood insurance programs.

The District has the power to plan, design, construct, or acquire, equip, relocate, maintain, and operate drainage facilities and has enacted a District-wide flood plain regulation. At present, the District encourages local agencies to adopt, with the assistance of the District, their own flood plain regulations. The District also makes planning and design information available, including mapping of the Drainage District that delineates drainage basins and provides physical and hydrologic parameters, design rainfall information for runoff analysis, statistical analysis of long-term records, and other information that becomes available from time to time.

UDFCD Flood Plain Regulation

The model flood plain regulation of the Urban Drainage District is a flood plain management tool which is designed to foster flood plain development that is consistent with sensible uses of flood plains. The regulation is designed to be supplemented by the national program of flood insurance administered by the Department of Housing and Urban Development (HUD). The purpose of the regulation is to promote the public health, safety, and general welfare, to minimize flood losses in areas subject to flood hazards, and to promote wise use of flood plains. The regulation has provisions for non-conforming uses, for those individuals located in the flood plain prior to adoption of the regulation.

Under the regulation, a flood regulatory district may be subdivided into a floodway district and a flood storage district. The flood regulatory district is defined by computing the 100-year flood plain limits under existing channel and flood plain conditions. The floodway district must be defined by hydraulic studies and it comprises the area needed to pass the 100-year flood. The flood storage district consists of the remainder of the flood regulatory district. Subdivision of the flood regulatory district into the floodway district and flood storage district must not cause a 100-year flood water surface profile to rise more than one foot above that for the flood of the flood regulatory district.

State and Regional Agencies

Several state and regional agencies provide information and assistance for the planning and design of urban drainage probrams and facilities. In addition to the Urban Drainage and Flood Control District, these organizations and agencies may be consulted:

Denver Regional Council of Governments (DRCOG)

The DRCOG serves the standard metropolitan statistical area which covers approximately the same portions of the Platte River drainage basin as the UDFCD. The DRCOG is a regional planning agency responsible for collecting, coordinating, and disseminating planning information, guiding regional planning efforts, and assisting local jurisdictions in obtaining federal and state aid on urban problems.

Division of Natural Resources (State Engineer)

The diversion of water from public streams is subject to the laws of the State of Colorado. When stream flow is not sufficient to satisfy the demand of all water users, the state, acting through the State Engineer and subordinate water officials, exercises its authority to regulate and control diversons.

Colorado also provides that any reservoir of a capacity of more than one thousand acre-feet or having a dam or embankment in excess of ten feet high in vertical height, or having a surface area at high-water line in excess of twenty acres shall not be constructed unless the plans and specifications have first been approved by the State Engineer.

Colorado Water Conservation Board

This agency was created in 1937 to promote the conservation of the waters of the State of Colorado. The Board has nine appointed members selected from designated geographical areas of the state. Duties of the board with respect to urban drainage and flood control are defined by statute as follows:

"Devise and formulate methods, means, and plans for bringing about the greater utilization of the waters of the state and the prevention of flood damages therefrom, and to designate and approve storm or floodwater runoff channels or basins, and to make such designations available to legislative bodies of cities and incorporated towns, to county planning commissions, and to boards of adjustment of cities, incorporated towns, and counties of the state;

"Gather data and information looking toward the greater utilization of the waters of the state and the prevention of floods and for this purpose to make investigations and surveys;

"Cooperate with the United States and the agencies thereof, and with other states for the purpose of bringing about the greater utilization of the waters of the State of Colorado and the prevention of flood damages."

Tucker-Talk

by L. Scott Tucker

Timely Comment from the District's Executive Director

• Richmond, Virginia, is again digging out from severe flooding. The Governor of Virginia in October proclaimed a state of emergency and set early estimates of damages in excess of $19 mililon. The latest Virginia flooding has occurred on the heels of destructive flooding wrought by the floods that followed tropical storm, Agnes, late in June. I do not know what the probability of occurrence for these storms are, but I hope for the sake of Virginians it is less than twice a year. It appears that they were rocked with two rare events in one year and one can hear them saying "that river never gets that high!" But it did, twice in five months. In our semi-arid high plains area "cloudbursts" are a major threat, as shown by the history of damaging floods in Colorado. The pictures showing flood damage in Scottsdale, Arizona, and Rapid City, South Dakota, are stern reminders of what *can* happen.

• The first phase of the South Boulder Creek drainage study was completed in October. The consultant, R. W. Beck, submitted an interim report on October 23, 1972. Alternatives considered and presented included "do nothing", flood plain zoning, limited structural improvements, and complete channelization of the entire creek. Boulder County, the City of Boulder, and the Drainage District are now evaluating the alternatives available. After a decision is made, probably in November, the consultant will complete the master drainage plans for the alternative selected.

• Phase A for Big Dry Creek was also completed in October. This involves Adams County, Westminster, and the Drainage District. There is very little development on Big Dry Creek and the problem is essentially one of preventing problems from occurring. Westminster, Adams County, and the District will evaluate the alternatives available and one will be selected, probably in November. Phase B and the finished drainage master plans are scheduled for completion in January or February of 1973.

• It was noted in the last issue of *Flood Hazard News* that Federally subsidized Flood Insurance rates had been reduced even further than the original low rates. Owners of property situated on flood plains should be advised by local officials of the advantages of purchasing the subsidized insurance as one means of protecting their property. Flood plain property owners should also be advised by their attorneys and engineers that flood insurance offers an alternative to expensive structural improvements. Citizens in the following Denver metropolitan communities are eligible for the HUD subsidized insurance: Englewood, Boulder, Denver, Lakewood, Wheat Ridge, Arvada, unincorporated areas of Adams County, unincorporated areas of Arapahoe County, Sheridan, Broomfield and Louisville.

• The Drainage District Board of Directors adopted a 1973 operating budget of $1,972,700 at their October meeting. The Directors also re-certified the 1/10 mill tax levy that is to be assessed on property in the six-county District area. The budget includes $1,468,000 in state, federal and local moneys for Sanderson Gulch. In addition, $91,000 is expected to be contributed by local jurisdictions for drainage studies. Other special projects included in the budget are $13,000 for the USGS rainfall/runoff program, $6,000 for cost/benefit analysis research, and $6,000 for hydrology research. The 1/10 mill levy will be assessed on a total property valuation in the District of $3,155,876,690. This is up from approximately $2,940,000,000 in the previous year.

• The 1972 ASCE Annual and National Environmental Engineering Meeting was held in Houston, Texas, in October 1972. One of the papers was presented by Scott Tucker, prepared in cooperation with Leonard Rice, Consultant to the Drainage District, on the subject, "Flood Plain Management in the Denver Region." Copies of this talk are available, while they last, from the District Office.

RESIDENTIAL AREAS AND SHOPPING CENTERS IN SCOTTSDALE, ARIZONA, WERE FLOODED WHEN HEAVY RAINS CAUSED CANALS TO BREAK AND OVERFLOW.

Project REUSE Reports Now Available

Articles about Project REUSE (Renewing the Environment through Urban Systems Engineering) have been presented in the past two issues of *Flood Hazard News*. Project REUSE, completed in August 1972, was a cooperative program undertaken by the Urban Drainage District and the Denver Regional Council of Governments, financed partly by the federal Department of Housing and Urban Development.

Much of the data and information developed during the project is now available in a series of reports that can be obtained from the Drainage District office. The reports listed below are available at no charge while the limited supply lasts. Copies can be mailed to those not living in the Denver area, but others are requested to pick up copies at the Drainage District office located just off the Valley Highway at 181 East 56th Avenue in the Lucas Building.

1. "Project Re-Use Final Report:" The final report includes a proposed 20-year regional program for major drainage in the Denver region.
2. "Rainfall/Runoff Information, Magnitude/Frequency, Design Rainfall, Small Urban Basins:" This report contains flood magnitude and frequency data, design rainfall data for various storm frequencies, and a description of the USGS small basin rainfall/runoff information system.
3. "Drainage Basin Descriptions:" This report contains maps and data delineating and describing 398 drainage sub-basins in the Denver region. Sub-basin information is published in 10 sections, one for each of the 10 planning basins.
4. "Master Plan for Major Drainage, Henry's Lake Area:" This report documents a master planning methodology for regional major drainage. Application of the methodology is described for a small, rapidly urbanizing basin.
5. "Storm Drainage and Flood Control Criteria:" This report discusses criteria that can be used in major storm drainage and flood control planning and program development.
6. "Flood Management Plan:" This report presents a flood management plan for the Denver region including warning, damage monitoring, and recommendations for establishing a flood management system.

HOMES IN RAPID CITY, SOUTH DAKOTA, WERE DEVASTATED WHEN FLASH FLOODS CASCADED THROUGH SMALL URBAN STREAMS. MANY PARTS OF THE DENVER AREA ARE VULNERABLE TO SUCH FLOODS.

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