

THE URBAN DRAINAGE AND FLOOD CONTROL DISTRICT
Silco Oil Building, 181 East 56th Avenue, Denver, Colorado 80216. Telephone: (303) 534-0105

DRAINAGE CONTROL THROUGH PLANNED UNIT DEVELOPMENT

By *HOWARD B. BROWNING*

*Director of Public Works
City of Westminster*

A perplexing situation facing local government authorities often is provision of proper drainage facilities and protection against flooding in new developments. The attitude that it doesn't rain much in the Denver Front Range corridor and therefor storm sewerage may be disregarded, is a fallacy proven by recent disastrous floods. Assuming that our cities and counties adopt the policy that drainage holds equal importance with water, sanitary sewers, and streets, how can controls be exercised? Tools available include:

- Local improvement districts
- Flood plain zoning
- Unit or property taxes and levies
- Comprehensive planning
- Engineering studies and guides
- Capital improvement projects
- Land use controls

Most governments have used one or more of these to address the problem, with some doubtful degree of success to date. The experience of the City of Westminster may help others.

From its incorporation in 1911 until the mid-1950's, Westminster was another separate town, a suburb of Denver, but somewhat removed. A growth spurt in the latter part of the decade gave many problems to the City, one of which was drainage. In the early 1960's, Westminster formed an improvement district and installed the basic storm sewer system for the City—generally between 80th and 72nd Avenues, from Sheridan to Federal Blvds. Minor improvements have been made since then, but the system proved to be well-designed and workable.

During the period of 1969-71, Westminster annexed to the North and West of the original City so that currently it encompasses about 24 square miles. By pre-design and with planning forethought, the new areas were limited to one drainage shed, Big Dry Creek, and all its tributaries,

except that already within Broomfield. The area was entirely raw ground, some under cultivation, but there was no development. Naturally, one of the primary purposes of the annexation was to prevent the uncontrolled sprawl that has been so evident beyond incorporated suburbs. It was recognized early that drainage was one of the important controls that must be exercised.

HOW?

Through a process of practical application of the available tools, Westminster decided that overall land use control was the most effective method. An updated Comprehensive Plan was formulated, coordinated and adopted. In part the Plan states:

"Storm drainage requirements must be individually designed by a qualified engineer representing the developer, and such requirements checked and approved by the City. Generally, costs for storm sewers and appurtenances are to be paid by the developer. Criteria of the Denver Regional Council of Governments and the Urban Drainage and Flood Control District will be used as a guide in storm drainage matters. —All development proposals are to contain a drainage study by a qualified engineer, using procedures outlined in the "Urban Drainage Manual" published by Denver Regional Council of Governments. City of Westminster personnel will review all such reports and they will then be submitted to the Planning Commission. —Major drainage areas, such as Big Dry Creek, are to be kept open in a natural state. They are to have the capacity to carry storm water from a 100-year frequency storm, in conformance with studies of the Urban Drainage and Flood Control District."

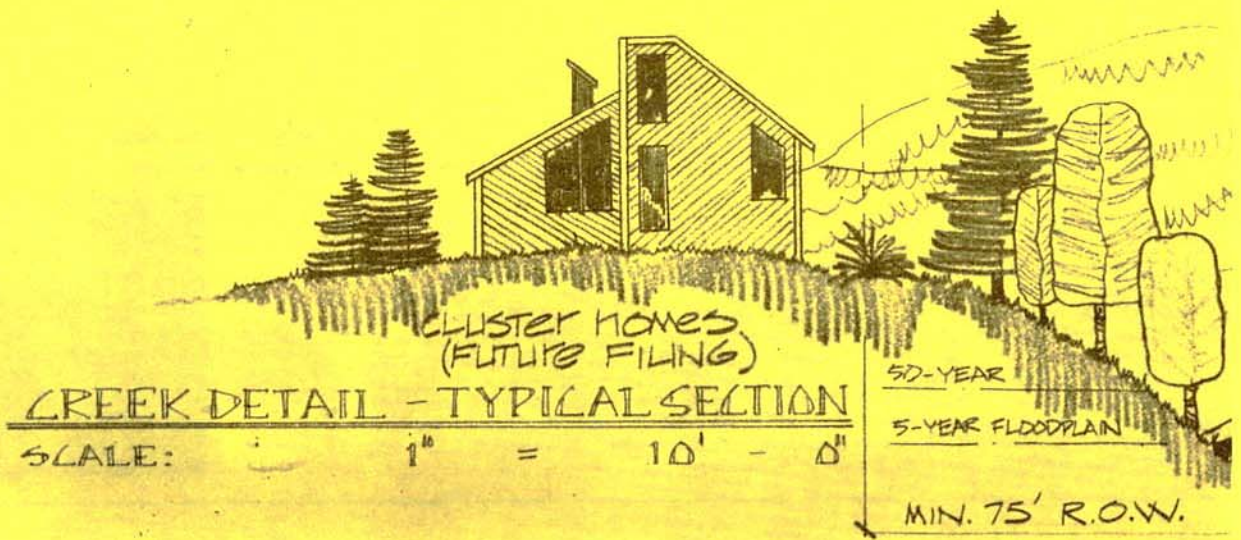
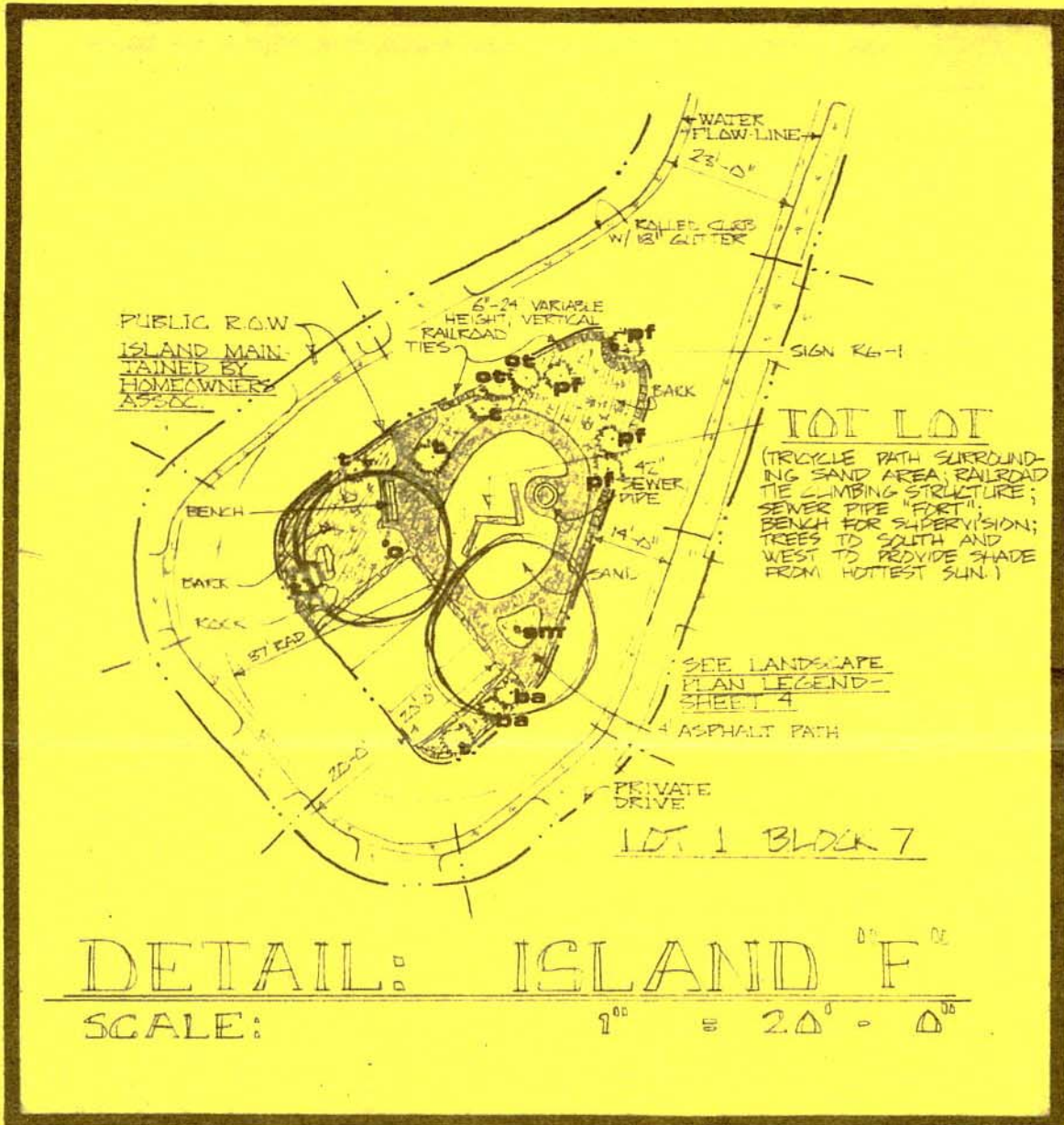
(Continued on Page 5)

ABOUT THE AUTHOR . . .

HOWARD B. BROWNING is Director of Public Works for the City of Westminster. In this position he is responsible for Planning, Engineering, Protective (building) Inspection, Streets and Storm Sewers, Utilities, and Central Garage. About half the City's work force is in this Department. Mr. Browning is a graduate Civil and Sanitary Engineer, Registered Professional Engineer; and is active in American Water Works Association, Water Pollution Control Association, Board of Directors for Denver Metropolitan Sewer District, Regional Transportation District, Rotary Club, and is currently President of the Colorado-Southern Wyoming Chapter of American Public Works Association. He, his wife Sue, and two children reside in Westminster.



COTTON CREEK
 SUBDIVISION FILING NUMBER ONE
 IN THE CITY OF WESTMINSTER, COUNTY OF ADAMS, STATE OF COLORADO
 SHEET 11 OF 21
 OFFICIAL DEVELOPMENT PLAN





COMPREHENSIVE PLAN City of Westminster

"1973"

Drainage Control—

(Continued from Page One)

This, then, became the policy for the City to follow. It was recognized by the City Administration that the dangerous area lies between policy and program, or implementation.

PLANNED UNIT DEVELOPMENT

The zoning process of qualitative control known as planned unit development, PUD, is virtually 100 per cent employed by Westminster in the 18 square miles of new lands. The City and Adams County contracted with the Urban Drainage and Flood Control District to analyze Big Dry Creek. The completed report shows not only the flood plain (on ultimate development of tributary areas) but also a guide to all major facilities to be installed. With PUD and the report, and with the back-up of Denver Regional Council of Governments' Manual, the City uses a procedure of coordination and analysis for all new developments.

- After initial concept discussions, developers, planners and engineers submit sketch plans for comment from the City's Department of Public Works (Planning, Engineering, Utilities) and Department of Parks and Recreation (open space).
- Preliminary Development Plans (PDP) are submitted for review. The PDP eventually becomes the document upon which the grant of PUD zone is granted. Concurrently, a preliminary drainage report is reviewed by the City. This report sets the concepts to be used in the final development—gutter flow, storm sewers, channels, retention ponds, and/or channels. This report may be amended several times until the developer, his engineer, and the City are satisfied the concept will work. Detailed drainage reports infrequently are required at this stage to explain special problem areas.
- The PDP is coordinated by the Department of Public Works with all City Departments, then with all other affected agencies, such as school district, State Division of Highways, adjacent county or city, Mountain Bell, Public Service Co., Post Office, etc. At this point, the developer and his consultants finalize the PDP incorporating all comments.
- The City's Planning Commission and City Council hold public hearings on the PUD zone and plan, referring any suggestions back (through the City Staff) to the developer.

By this procedure, the developer then knows his land use, costs of development, and all basic controls required.

CONSTRUCTION

The PUD procedure requires one further step before any building permits may be issued.

- The builders' consultants develop the Official Development Plan (ODP) setting the specifics of the proposal—building elevations and plans, site layout, landscaping, paving, water and sanitary sewers, open space or parks, and drainage facilities. These are not the engineering construction or working drawings, but are the overall plans upon which the details will be developed. The final drainage report is also submitted for review.

- The ODP is again coordinated like the PDP and all comments are incorporated. (Concurrently with the plan, a subdivision plat is prepared and reviewed.)
- The developer executes a standard Subdivision Agreement, with 100 per cent surety, for all public improvements including the drainage facilities.
- The Planning Commission and City Council review the plans.

When this process is completed, the plat, plan, and agreement are executed and filed of record.

For the drainage portion of the public improvements, the developer engineer submits the construction drawings for review. After approval by the City, an authority to proceed is issued; pre-construction conferences are held; the work inspected by the City during construction; and, when completed properly, accepted as public facilities.

RESULTS TELL THE STORY

To date, well over 50 per cent of the raw land has been zoned PUD. Several major developments are now under construction. All of these show, or have contracted for, the ultimate drainage facilities serving the property. The entire floodplain of Big Dry Creek and its tributaries is being dedicated to the City for greenbelts and trails. In the City of Westminster, damages due to floods will have become a thing of the past.

FLOOD PLAIN MANAGEMENT Developing a Program

By WILLIAM G. DeGROOT
Administrator

As the District's Flood Plain Management Program develops, it will be explained through this "column" in *Flood Hazard News*.

Why does anyone take up Flood Plain Management as a career?

In my place, I was impelled into it. The June 9, 1972, flood in Rapid City, South Dakota was the catalyst that made me realize how disastrous floods can be. In that flood, 238 people died and property damage approached \$100 million. I was not in Rapid City at the time, but I toured the city a week after the flood. It was a very depressing sight.

Rapid City's recovery plan is based on the flood plain management concept. The City, with an urban renewal grant, is acquiring and clearing a floodway through the city. Because of Rapid City's efforts, I began to study flood plain management, and the more I studied it, the more I liked it. I truly believe that there are many, many instances when flood plain management can be the best and cheapest method for reducing flood damage.

I have developed a slide show which consists of slides showing the damage caused in and around Rapid City on June 9, 1972 followed by a 15-minute talk about flood plain management. The entire program lasts from 30 to 40 minutes, depending on the number of questions from the audience. If you have a group that would be interested in seeing this presentation, please contact me.

My immediate plans are to get to know the Denver area and the people (to get my feet wet); and to begin development of a comprehensive flood plain management program. Any comments or questions you may have will be appreciated.

RAPID CITY'S FLOOD

Floods in excess of "the 100-year flood" can and do occur, with tragic results. A new look at Flood Plains

by *BILL DeGROOT*

Administrator, Flood Plain Management Program, UDFCD

To tell the story of Rapid City and the disastrous flood that occurred there on June 9, 1972, would take many times the space available here. In fact, there are as many stories to be told as there were people affected. Nevertheless, a brief look at Rapid City before, during and after the flood can be a valuable lesson for all of us. Rapid City is a good example for the Denver metro area because of the physical similarities between Rapid City and many communities in the Denver area.

The Rapid Creek drainage area above Rapid City is 385 square miles. The upper 319 square miles are controlled by Pactola Dam, which is about 14 miles upstream from Rapid City and has a flood storage capacity of 43,000 acre feet. Since the construction of Pactola Dam, the only storms which caused flooding problems in Rapid City were those which centered over the 66 square mile area between Pactola Dam and Rapid City. This drainage area consists of steep walled canyons and narrow valleys which, when combined with steep stream gradients, are responsible for the flash flood potential of Rapid Creek.

Rapid Creek is located at the mouth of Dark Canyon, just below the point where the Rapid Creek flood plain begins to widen from the narrow V-shape which is characteristic of the area above Rapid City.

Canyon Lake Dam, which failed during the June 9 flood, was located on the west, or upstream, edge of town. It was built for recreational purposes and had negligible flood storage capacity.

The area of Rapid City is about 17 square miles. Approximately 18 per cent of this area is located in the Rapid Creek flood plain. Before the 1972 flood, 11 per cent of the city area was devoted to open space uses, mostly in the flood plain. However, there were also many commercial and residential developments in the flood plain.

The City Council had committed itself to establishing

flood plain zoning in 1971, and was waiting for a final determination of the flood plain boundaries before enacting any zoning ordinances. Federally subsidized flood insurance had been available to the citizens since 1971, but very few people had taken advantage of it.

On the night of June 9, 1972, a storm centered over the 66 square mile area above Rapid City. The average rainfall over this area was 9.1 inches; 8.7 inches of which fell in a 6-hour period. In other areas of the Black Hills, up to 15 inches fell in 6 hours.

Rain began to fall west of Rapid City around 5:00 P.M. and in the city around 7:00 P.M. By 8:00 P.M., flood warnings were being broadcast and police, firemen and National Guardsmen were warning residents in flood hazard areas. Many people did not heed the warnings, and when the crest hit between 11:00 P.M. and 11:30 P.M., hundreds of people were caught unprepared. The rapidly rising water combined with the darkness to create a very dangerous and often fatal situation.

There appears to be some disagreement as to the peak flow entering Canyon Lake. The Corps of Engineers estimated the peak at 34,500 cfs (3), while Dr. Tom Propson estimated the peak inflow at 41,400 cfs (1).

The peak discharge from Canyon Lake was estimated at 60,000 cfs by the Corps, and at 58,800 cfs by Dr. Propson.

It is interesting to note that inflow to Canyon Lake was two and one-half to three times as large as the Intermediate Regional Flood (100-year flood) of 14,500 cfs, as defined by the Corps of Engineers (2). In fact, the inflow approached the Corps' Standard Project Flood peak of 45,000 cfs.

Nearly one-sixth of the population of 43,000 lived in

(Continued on Page 8)

ABOUT THE AUTHOR . . .

WILLIAM G. DEGROOT, Administrator of the District's Flood Plain Management Program, joined the staff on January 31, 1974.

Bill received his Bachelor of Science and Master of Science degrees in Civil Engineering from the South Dakota School of Mines and Technology.

He worked for Shell Oil Company at its Martinez refinery, but left after six months to begin a two-year hitch with the U.S. Army. He spent a year at Fort Belvoir, dividing his time between being a student at the Engineering School, and serving as Commanding Officer of an Atomic Demolition Munitions Platoon. His second year was spent in Viet Nam with a construction task force.

Released from military service, Bill returned to Shell Oil Co., where he spent the next ten months as a field engineer. In August, 1972, he returned to school majoring in water resources. He completed his M.S. requirements in January, 1974.

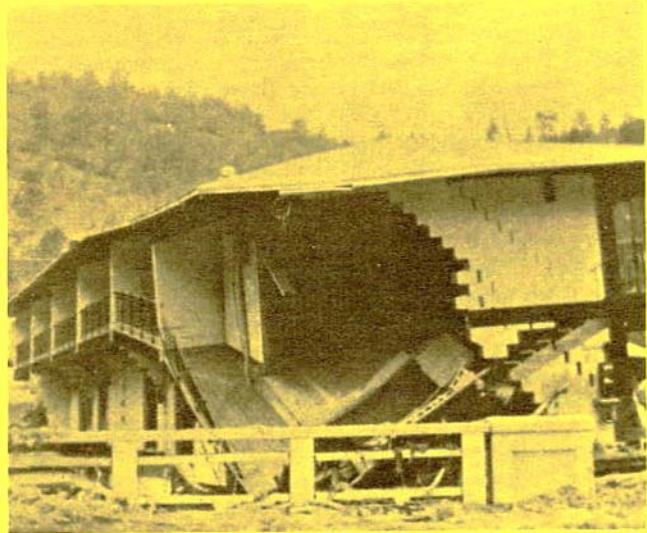
Bill's wife, Mary, is still in Rapid City. She is an intern in medical technology at Rapid City Regional Hospital. In June, Mary will join Bill at Denver.

Bill's interests include football, tennis, photography, and "hiking through the woods." He is a member of ASCE.





AN AERIAL PHOTO OF A TRAILER COURT ON THE BANKS OF RAPID CREEK



A NEW MOTEL BUILT ON A TRIBUTARY TO RAPID CREEK



HOUSE CARRIED INTACT BY FLOOD WATERS TO A NEW LOCATION



MORE BUILDINGS CARRIED INTACT BY FLOOD WATERS TO NEW SITES



THIS AERIAL PHOTO SHOWS BOTH GOOD (TOP) AND BAD (BOTTOM) FLOOD PLAIN MANAGEMENT PRACTICES

Rapid City's Flood

(Continued from Page 6)

flooded areas. One-fourth of the city's business establishments were also located in the flood plain. Within the four-county area affected by the storm, 238 people died and damage estimates approached \$160 million. Most of the deaths and \$100 million of the damage occurred in Rapid City.

Six hundred houses were destroyed and 930 were damaged. Thirty-five businesses were destroyed and 242 more were damaged. Three hundred and twelve mobile homes were destroyed. More than 5000 automobiles were either damaged or destroyed.

Many effects of such a disaster can not be so easily listed. The shock of losing everything you owned; the grief over the loss of a loved one; the horror of spending the night clinging to a tree to keep from being swept away, are all very real and tragic effects felt by the citizens of Rapid City.

Rapid City's recovery efforts are best described in the following excerpt from "Putting the Pieces Together. . .", the 1972-1973 annual report of the Rapid City Urban Renewal Department:

"Shortly after the disaster, officials of the U.S. Department of Housing and Urban Development (HUD) contacted Mayor Don Barnett and the City Council to inform them of the possibility of an urban renewal project for blighted areas caused by the disaster.

"At the request of HUD, the City made application for an urban renewal planning grant immediately following the flood, and by June 26, \$300,000 was made available to make a study for a renewal project. HUD required that the study be completed in 60 days.

"At this point, Leonard Swanson was named Urban Renewal Director, and THK Associates of Denver were designated as consultants to conduct the required study. The study began on July 5 . . . a public hearing was held on an urban renewal application on August 24 . . . and the next morning, Mayor Barnett carried an application for a \$64 million loan and grant program to the HUD Region Eight Office in Denver.

"Clean-up operations continued throughout the city during the latter part of the summer and into the fall. On October 4, Vice-President Spiro Agnew visited Rapid City and announced approval of the \$64 million project request. HUD Secretary George Romney brought the contracts to Rapid City for the Mayor to sign on November 1. That action officially put Rapid City in the urban renewal business.

"The \$48 million in federal monies requires a considerable effort on the part of local government. Rapid City must come up with \$16 million in matching funds.

"A system of non-cash credits will make up the bulk of the \$16 million in required matching funds. Credits toward the match total are given for construction of new state highways in the area; city street construction; new public buildings such as the library, civic center, fine arts center; and for proposed development within the floodway from Canyon Lake to Campbell Street."

The first two years of the urban renewal program are devoted mainly to disaster recovery. This consists of acquiring about 1000 acres of flood plain land along Rapid Creek and clearing the land to create an unobstructed 5-mile long floodway through the city. The floodway is the entire 100-year flood plain as determined by the Corps of Engineers.

As of February 4, 1974, the City Council, sitting as the Local Public Agency, had approved offers for 1,098 parcels of land with a total acquisition price of approximately \$19,650,000.

The floodway will be developed with a matching grant from the Bureau of Outdoor Recreation. The development program has been divided into three phases, with the \$3.6 million Phase I cost to be divided equally between BOR and Rapid City.

In an effort to protect the new floodway, Rapid City has annexed areas upstream from Canyon Lake Dam. If HUD will approve, the city will then extend the floodway into these areas.

The lessons to be learned from Rapid City's experience are many and varied. We have seen that floods in excess of the 100-year flood can and do occur. We have seen the price of such floods, in both human and economic terms. And we have seen the time and money required for recovery.

We must learn from Rapid City's experience. We must stop repeating the mistake of unchecked development in areas which we know will someday be flooded.

References:

1. "Computer Simulation of Canyon Lake Dam Failure," by Dr. Tom Propson, Assistant Professor, South Dakota School of Mines and Technology.
2. "Flood Plain Information, Rapid Creek, Rapid City, South Dakota," Dept. of the Army, Omaha District, Corps of Engineers.
3. "Meteorology and Hydrology of Rapid City Flood," by Keith A. Johnson, P.E., Hydraulic Engineering and the Environment, ASCE, 1973, pp. 451-455.

Interesting New Post for Mayor Paul Beck of Aurora



Mayor Paul Beck of Aurora has an interesting assignment from Energy Czar Paul Simon. The Administration felt there was a lack of information and feedback as to how the energy crisis is being felt in cities of 50,000 to 100,000. Moreover, it was felt that there was relatively little communication with Mayors. So Energy Chief Simon invited a selected group of Mayors, one from each state — including Mayor Paul Beck — to come to Washington on February 4th for the needed forum and interchange of ideas. Since then, Mayor Beck and his counterparts in the other states have been continuing to serve as an open channel of communication. Much of the information has to do with various types of rationing systems, informal and otherwise, with emphasis on blunders that may be avoided by knowing the facts as to what happened when that particular idea was tried out in.

ANNUAL BOARD OF DIRECTORS MEETING

The Board of Directors of the Urban Drainage and Flood Control District held their annual meeting and election of officers on February 1, 1974.

John Nicholl, Chairman of the Arapahoe County Board of Commissioners was elected for his fourth term as Chairman of the Board of Directors. Commissioner Nicholl has served as Chairman of the Board ever since the District began operations in late 1969.

Councilman Irving Hook of the City and County of Denver was re-elected as Vice Chairman; Mayor Paul C. Beck of Aurora was re-elected as Treasurer; and Mayor James J. Richey of Lakewood was elected as Secretary.

Mr. Charles S. Robinson, P.E., serves as the fifth member of the Executive Board.

Former Mayor Kenneth Mitchell of Brighton and former Mayor Richard McLean of Boulder are no longer on the Board of Directors. They were replaced by Mayor Penfield Tate II of Boulder and Mayor Tom Carrillo of the City of Thornton.

Brian S. Kolstad Joins UDFCD Staff as District Engineer



Brian S. Kolstad joined the District's staff on January 14, 1974, as the District's Civil Engineer. He will be involved with the District master planning projects and construction efforts.

Brian was born in Los Angeles, California, on June 28, 1944, and grew up in Compton and Long Beach, California. Brian went to Long Beach City College (Junior College) where he received an Associate of Arts Degree and then transferred to California State College at Long Beach. After 1½ years, he left school and went to work for the City of Long Beach as a policeman. He was assigned to various divisions and assignments during his 3½ years at the department.

During the last 2 years of police work, he went part time to California State College at Long Beach, to finish his Bachelor of Science Degree in Engineering with a major in Civil Engineering, which he received in June of 1970.

Brian then took a position as Civil Engineer with the Orange County Flood Control District in Santa Ana, California (a few miles from Disneyland). He continued attending college part time and obtained a Master of Science

in Civil Engineering Degree, majoring in Hydraulics on January 7, 1974.

Brian's flood control work with the Orange County FC District included an orientation period where he worked on a survey crew; in the maintenance and heavy equipment division; as a construction inspector; also in right-of-way, computers, and planning; then he was transferred to Design where he worked on several projects before his assignment as project engineer.

As project engineer, Mr. Kolstad designed three major projects including open channel concrete box culverts and rectangular channels, pressure pipes and box culverts, and open channel with sand bottom and rock rip-rap side slopes, including a drop structure.

After 1½ years in Design, Brian was transferred to the Construction Division where he was Resident Engineer on one of his own Design projects. His last 10 months at the District included flood plain delineation and master drainage planning.

Brian became a registered Professional Engineer in California in February 1973 and is currently applying for Colorado registration. He is an Associate Member of the American Society of Civil Engineers.

Brian and his wife, Elaine, have one boy named Eric who will be three in July. They are currently buying a home in the Green Mountain area of Lakewood.

Brian's interests include hunting, fishing, camping and hiking. The Kolstad's expect skiing and ice skating to add to their enjoyment of the Colorado area.

"URBAN RUNOFF—QUANTITY AND QUALITY"

Theme of ASCE Conference

A research conference entitled "Urban Runoff—Quantity and Quality," will be conducted by the Urban Water Resources Research Council ASCE through the Engineering Foundation. The conference is planned for August 11 through 16, 1974 at Franklin Pierce College, New Hampshire.

The conference is designed to review developments in analysis and technology of urban water resources within the last three years, and to outline both the opportunities for applying these findings to decision-making and the remaining problems which should be the focus of additional research.

There are three specific objectives of the conference. The first is technology transfer, which is the ability to make available promptly and effectively new technologies and analytical approaches whether derived from research or otherwise.

The second objective is to consider the availability of

data/information and the technology of data collection in the urban water resources field. The third is to highlight remaining urban water problems requiring solution and inferences to be drawn concerning research priorities.

Conference sessions will include user needs for problem-solving; social, political and economic aspects; collection, storage and treatment of urban run-off; environmental impacts and esthetic considerations; data collection; and flood plain management and natural hazards. A conference report will be published.

Attendance is by invitation only and persons who wish additional information may contact either of the following: William Whipple, Jr., Chairman, Urban Water Resources Research Conference, 395 Mercer Road, Princeton, N.J. 80504, or Scott Tucker, Secretary, Urban Water Resources Research Council, Urban Drainage and Flood Control District, 181 E. 56th Avenue, Denver, Colorado 80216.

MEET THE NEW BOARD MEMBERS

PENFIELD W. TATE, II

Mayor of Boulder

Mayor Tate is an attorney engaged in the practice of law in the Boulder area, and also is kept busy serving many groups and organizations as a consultant.

His degrees are from Kent State in BA Pro-Law, Political Science (1953), and the J. D. degree (1967) from the School of Law, University of Colorado at Boulder.

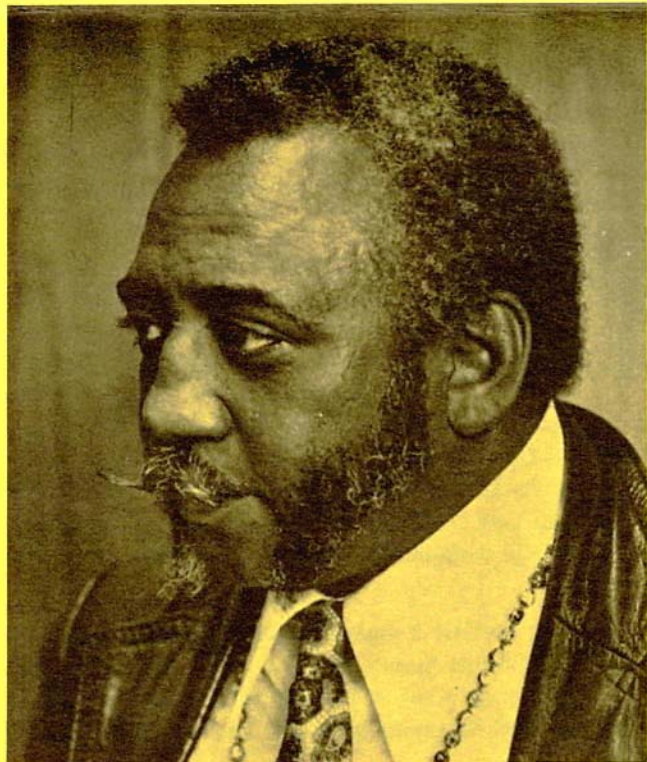
During his 14 years in military service as an Artillery Officer Penfield Tate held positions of responsibility in both staff and command. Working in a legal capacity for Mountain Bell, he spent two years in the labor relations section of the general personnel department.

His extensive experience in labor relations and human relations fields, led to his intimate relationship with the Human Relations Committee on the campus, and his functioning as campus Ombudsman.

His leadership activities included being Chairman of the United Black Action Committee in Boulder (1968-1971) where much of the work had to do with a continuing study of the City's involvement with organizations which discriminate in membership.

As a member of the board of directors of the Boulder County Mental Health Center Board, Mr. Tate was chairman of the governmental affairs committee. He also served as legal advisor to the Executive Board.

Boulder has a very active Human Relations Commission, and Mr. Tate became well known for his activities as a member (1969-1972).



Mayor Tate and his wife, Ellen, have four children ranging in age from four to 17 years. In addition to his many activities in Boulder, Penfield W. Tate, II is a Practicing Attorney in Denver, with office at 1658 High Street, Denver, Colorado 80218.

Tucker-Talk

by L. SCOTT TUCKER

Timely Comment from the District's Executive Director



NEW DISTRICT STAFF

Jack Gianola, Civil Engineer for the District, left the District on December 15, 1973 to join E. F. Braun Construction Co. We were sorry to see Jack leave, but he had a hankering to get involved with construction and did not feel he should pass up the opportunity.

We were fortunate to find Mr. Brian Kolstad from Tustin, California, to take over where Jack left off. Brian started on Jan. 14th and is now responsible for keeping our planning projects and final design efforts running smoothly. A summary of Brian's background and interests appears elsewhere in this issue of *Flood Hazard News*.

To complement our design master planning and construction activities, we have begun a program of Flood Plain Management. This will include activities related to flood insurance, flood plain regulations, flood hazard area delineation, early warning systems, developer reviews, flood damage surveys, and flood plain education. To head up this effort, William G. DeGroot joined the District's staff on Feb. 1, 1974. Bill has written an article for this issue of *Flood Hazard News*, and there is also a brief synopsis of his background and interests.

PLANNING AND CAPITAL IMPROVEMENT PROGRAMS

Most Drainage and Flood Control Master Planning Projects scheduled for 1973 are now underway. These projects include:

Drainageway	Jurisdictions
Big Dry Creek	Arapahoe County, Douglas County, (Arapahoe County)
	Englewood, Littleton and Greenwood Village
Lakewood Gulch	Denver, Jefferson County and Lakewood
Westerly Creek	Arapahoe, Denver, Lowry Air Force Base, Corps of Engineers
Highline Canal	The Denver Water Board
First Creek	Adams County, Aurora, Arapahoe County
Lena Gulch	Wheat Ridge, Jefferson County, Lakewood and Golden
Van Bibber Creek	Arvada and Jefferson County
Basin 6100	Jefferson County and Arapahoe County
Goldsmith Gulch	Denver, Greenwood Village and Arapahoe County

Master Planning Projects that have been completed to date include:

Weir Gulch and Sanderson Gulch	Denver and Lakewood, Jefferson County
Big Dry Creek (Adams County)	Jefferson County, Westminster
South Boulder Creek	Boulder and Boulder County

The next task will be to initiate the Master Planning efforts scheduled for 1974.

In addition to Master Planning efforts, the District is moving ahead with final design on Sanderson Gulch

and hopes soon to be underway with final design for improvements to Englewood Dam.

Weir Gulch is also scheduled on our 1974 Improvement Program and efforts are underway to launch that project.

Improvements to Niver Creek, which is on the 1975 District Improvement Program, might get underway in 1974 with limited District support. The project was expedited somewhat because of a Federal emergency grant which has to be expended by November, 1974. Negotiations on Niver Creek will probably continue into 1975.

SEMINAR ON COSTS AND BENEFITS OF UDFCD PROJECTS

A seminar has been tentatively planned for April 25, 1974. The subject of the seminar will be *Costs and Benefits of Urban Drainage and Flood Control Projects*.

The results and findings to date of a joint research project by Colorado State University and the Urban Drainage and Flood Control District funded in part by the Office of Water Resources Research will be presented at the seminar. The seminar will be co-sponsored by the Urban Drainage and Flood Control District and the Colorado Environmental Resources Center.

Details regarding the seminar will be distributed to engineers and public works personnel in the Denver region.

FLOOD HAZARD AREA DELINEATION

The Urban Drainage and Flood Control District is proposing a 5-year flood hazard definition program in the Denver region. This is for those drainageways not included in the District's current 5-year planning schedule.

The Urban Drainage and Flood Control District has budgeted funds in its 1974 calendar year for flood hazard delineation, but because of the magnitude of the need, state financial support has been requested. It was proposed that the State appropriate \$210,000 for the fiscal period July, 1974 through June, 1975 to a state agency to contract with the Urban Drainage and Flood Control District, to help accomplish the first parts of a 4-year flood hazard area identification program for the Denver metro region.

A total of approximately 1,100 miles of major drainageways have been identified in the Denver region. Including hazard delineations by the Corps of Engineers, other Federal agencies and the Urban Drainage and Flood Control District, a total of approximately 700 miles of streams will have flood hazard areas defined by 1979.

In rapidly urbanizing areas such as Denver it is imperative that flood hazard areas be defined prior to consideration of requests for permits to develop in the flood plains. Flood hazard delineation is a prerequisite to successful flood plain management. Also, flood hazard areas should be defined so that citizens can determine whether or not they are in fact in a hazardous area. The intention of the District's request to the State Legislature for assistance is to speed up the flood hazard delineation process so that flood hazard areas could be defined for all streams by 1979.

THE URBAN DRAINAGE AND FLOOD CONTROL DISTRICT

EXECUTIVE COMMITTEE:

John J. Nicholl
Arapahoe County

Paul C. Beck
City of Aurora

Irving S. Hook
City of Denver

Richard McLean
City of Boulder

Charles S. Robinson
Engineer

L. SCOTT TUCKER, EXECUTIVE DIRECTOR

Dominick J. Gianola, District Civil Engineer
Barbara Cleghorn, Secretary

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

MEMBERS:

Hal Anderson
Jefferson County

Kenneth D. Mitchell
City of Brighton

David A. Curtis
Douglas County

Arlen E. Patton
Engineer

Jerry Grant
Adams County

James J. Richey
City of Lakewood

Kenneth M. MacIntosh
City of Denver

J. Ivanhoe Rosenberg
City of Denver

William H. McNichols
City of Denver

Wally Toebs
Boulder County



FLOOD HAZARD NEWS
Henry W. Hough, Editor

*“Dedicated to reducing the danger to property
and to the health and safety of persons living in the urban area”*

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

BULK
U. S. Postage
PAID
Permit No. 460
Denver, Colo.