FLOOD HAZARD NEWS

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March-April, 1972

THE URBAN DRAINAGE AND FLOOD CONTROL DISTRICT

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

L. Scott Tucker Selected as Executive Director

Announcement was made late in January that the Board of Directors of the Urban Drainage and Flood Control District had selected L. Scott Tucker as Executive Director. He took charge on March 1, 1972.

Tucker, 32 years of age, has been associated with the Engineering Research efforts at Colorado State University for the past two years where he has directed two major research efforts, sponsored by the Office of Water Resources Research of the Department of Interior and the National Science Foundation. The O.W.R.R. project involves the investigation of controlling combined sewer overflows by remotely controlled and computer-operated centers. The NSF project involves the development of concepts and procedures for total engineering of public works projects including ecological, sociological and visual harmony inputs. Prior to that time, he was Deputy Director of the American Society of Civil Engineers Urban Water Research Program at Harvard where one of the results was the pressure sewer system developed and tested.

In urban water matters, Tucker is well regarded having played a leading role in a National Conference at Andover, Massachusetts in 1968, and he participated in the review of the urban water policy developed by the National Water Commission's efforts last November in Airlie, Virginia.

Tucker holds a B.S. from Nebraska and an M.S. from the University of Arizona, both in Civil Engineering, and is continuing advanced work at Colorado State University. His family includes his wife, Shirleen, a son age three and a daughter, not yet one.

As Executive Director, Tucker will assume responsibility for the District's programs of coordinating and planning efforts with local jurisdiction and seeking to develop and utilize fully the drainage and flood programs of the state and federal government, especially those which assist the local communities with funding. The District also has a $200,000 program of engineering design and planning to protect and correct drainage ways under way for completion in 1972.

District Chairman John J. Nicholl, stated that Mr. Tucker was the unanimous choice of the Executive Committee from nearly 100 applicants.

Mr. Nicholl further stated that the District was extremely pleased to obtain the services of Tucker who combines a great deal of maturity, a track record in research and federal funding and an engineering background with the enthusiasm befitting his age.

Filling the Breach:

by L. SCOTT TUCKER

Before officially assuming the position of Executive Director of the District on March 1, 1972, I had the opportunity to observe the operations and activities of the District from an outside vantage point.

An interesting observation was the role that the Technical Advisory Committee (TAC) took in assisting the Board in running the District while a new executive director was being selected.

The Technical Advisory Committee is chaired by Bob McWhinnie of the Denver Water Board. It includes Ted Dieffenderfer of Boulder, Jack Haines of Adams County, William Moses of Jefferson County, Horace Smith of Denver, and Kells Waggoner of Englewood.

The TAC assisted the Board in developing the 1972 Work Program which is now in the process of being implemented; recommended qualified candidates to the Board for the executive director position; worked with the engineer in developing Phase A of the Weir/Sanderson Gulch study which was the first such study conducted by the District; and developed a list of qualified drainage engineers who may participate in District-supported projects.

Members of the TAC serve without pay and are on a voluntary status. They all have a serious commitment to the Denver region and particularly to the drainage problems that are being created by increasingly rapid urbanization.

The TAC will continue to be called upon to advise the District as the District's activities continue to develop. It should be recognized, however, that before the new executive director came on board, they had to contribute considerably more time than is normally expected from such an advisory group.

Chairman Bob McWhinnie and TAC Members, Ted Dieffenderfer, Jack Haines, William Moses, Horace Smith, and Kells Waggoner are certainly to be commended for their outstanding effort and contribution.

The URBAN DRAINAGE & FLOOD CONTROL DISTRICT

L. SCOTT TUCKER, EXECUTIVE DIRECTOR
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Revolutionary Changes Coming in Sanitary Engineering

by KENNETH R. WRIGHT
Wright-McLaughlin Engineers

[During the luncheon session at the Seminar, Kenneth R. Wright of Wright-McLaughlin Engineers spoke on "Alternatives to Facilities Construction." A substantial part of his talk is presented here.]

Several engineers from Colorado had an opportunity to attend a three-day seminar in Virginia last November. The seminar was sponsored by the Engineering Foundation, the American Society of Civil Engineers and the National Water Commission. Attending were 80 of the leading water engineers in our country.

It was evident that major changes are coming in urban water resources. These changes primarily relate to environmental preservation and enhancement, "people input" to the engineering and decision-making policies, and water resources management related to the quality of life for those people who live in our cities — a large portion of our national population.

In general, we are going to be looking at more "people engineering" in our everyday type of work. This may sound strange to some of you. However, this is the name of the game on a national level. Those engineering firms and engineers, and those administrative people and consultants, who don't believe in this type of effort or don't understand this approch to water engineering and planning will be left along the sidelines in the next few years.

Senate Bill 2770 (in the House it is H.B. 11896) is the most concrete example of what I am talking about. This bill, sometimes called the Muskie bill, would revolutionize sanitary engineering in the United States, and we expect it to be passed by Congress and signed by the President before the spring is over.

With regard to urban drainage, you can expect that urban runoff will need to be *purified* by some type of treatment during the next decade. Drainage planning and design now should anticipate this. Treatment of runoff waters may include one or more of the following:

1. Microstraining.
2. Land spray irrigation of water caught in detention ponds.
3. Filtration through sandy aquifers along river beds, such as the South Platte River.
4. Chlorination.
5. Upstream ponding and settling.
6. Putting runoff waters through conventional sewage treatment plants.

Upstream ponding will play an increasingly important role. This includes alternatives to facility construction. When we are talking about upstream ponding, we can include:

1. Rooftop ponding.
2. Parking lot pounding.
3. Ponding in park areas.
4. Construction of on-stream ponds.
5. Construction of off-stream ponds.
6. Infiltration areas.
7. Subterranean tunnels in major urban areas.

(Continued on Page 10)

REUSE

Results of Project Described at Regional Drainage Seminar

by ALAN L. FOSTER, *Director, Project REUSE*
Denver Regional Council of Governments

The Drainage District and the Denver Regional Council of Governments, cooperating agencies in Project REUSE, sponsored a Seminar on February 23 and 25 to present the drainage-related results of the Project to date. Four alternative conceptual approaches were offered, for managing urban drainage and flood control problems through 1990.

Presentations at the Seminar included the existing situation, the planning methodology and definitions employed, major drainage criteria, and the alternative concepts, as summarized below:

Background and Scope

A major objective of Project REUSE is development of an urban systems methodology which can be applied to urban drainage management in conjunction with established criteria, and a description of the existing situation: (a) to provide effective solutions to present problems, and (b) to implement measures which will prevent future problems from developing.

A significant feature of Project REUSE is a systematic analysis and classification of drainage subbasins, providing a description of the nature and extent of urban drainage problems within the Urban Drainage and Flood Control District (UDFCD). These make possible the identification of alternative measures for solving and/or preventing existing and future problems.

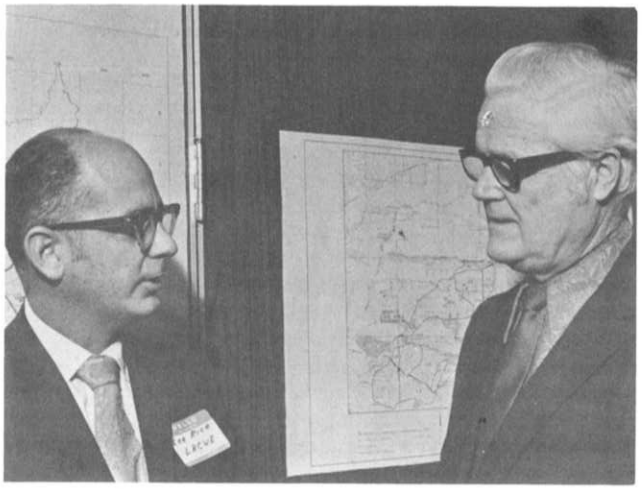
Preventive Master Planning

Out of this analysis it became clear that serious problems do not yet exist on many of the major drainage channels within the District. Consequently, a dedicated effort of preventing problems from developing, by master planning such channels, could produce significant results in terms of future problem prevention.

To undertake such a program of master planning it is necessary to have a guide for master planning that can be applied uniformly to any basin to produce a consistent result which meets established criteria and objectives. A Master Plan for Major Drainage of the Henry's Lake Area in Lakewood and Jefferson County was prepared to demonstrate the methodology and to serve as a guide for future master planning.

Master planning includes both Preventive and Construction actions. The distinction between preventive master planning (PMP) and design master planning (DMP) is essentially one of application and not of scope. As used

ALAN L. FOSTER WITH HAROLD BISHOP AND MARIANNE MCGALLIARD



LEONARD RICE AND NORMAN GAU OF CORPS OF ENGINEERS (OMAHA)

herein, master planning (which is sometimes termed preliminary engineering) is defined as follows:

MASTER PLAN: An engineering document including plan and profile drawings, showing to scale channel profiles and the plan of principal drainage works, with typical channel cross-sections and controlling elevations and dimensions for bridges, culverts and other structures. The general limits of the flood plain, under existing conditions and as modified by the proposed improvements and/or future developments upstream, are also defined in enough detail for flood plain regulation purposes. 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 and recommendations of an Environmental Design Team.

A. *Preventive Master Planning* (PMP) 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.

B. *Design Master Planning* (DMP) 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 prepare engineering cost estimates of principal features of the plan, so that final design drawings and specifications can be prepared and construction contracts awarded.

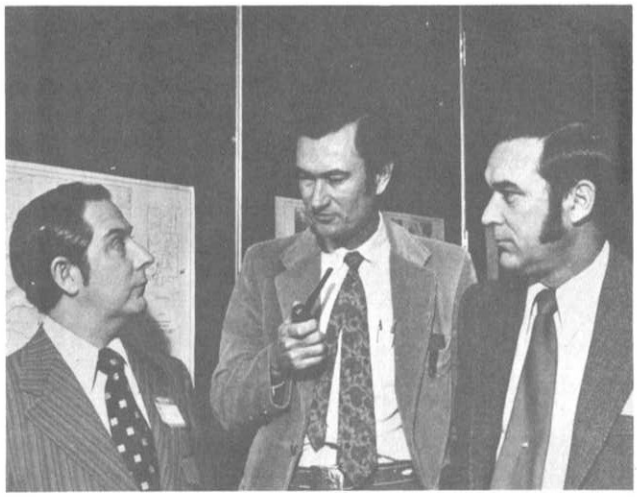
Master planning is an integral part of system planning, design and implementation. Master planning involves the systematic analysis of the existing situation, runoff analysis, and concept selection. A basin master plan must be definitive enough to provide a working tool for local jurisdictional planning, for review of development proposals by responsible governmental agencies, and for determination of their impact on the urban drainage system. The basin master plan serves as a planning tool for jurisdictions included within the basin, and provides a means of guiding and controlling development within the basin so that new development does not obstruct major drainage channels or occupy the flood plain area. A master plan also provides the basis for flood plain definition and regulation within the basin, and for implementing land use controls required to qualify communities and counties for federal flood insurance.

Criteria: The compilation of environmental and regulatory standards, on which decision or judgments may be based, are called criteria. Policies, goals, objectives, a plan and program, and design and operating standards comprise the regional criteria structure, supplemented by planning premises, principles and external constraints.

Drainage objectives, premises and principles for the Denver region follow:

Objectives need not be reached all at one time, or during a single year, or necessarily within any stated time. That does not invalidate them as objectives. Step by step progress toward objectives is inherent in planning and program development. Specific major drainage objectives for the Denver Region are:

—The physical ability to pass the major, or 100-year frequency, storm runoff, or equivalent, at any chan-



HERBERT POERTNER, DAVID DAWDY AND KELLS WAGGONER

ALAN FOSTER SPEAKING; TED DIEFFENDERFER, JACK HAINES AND KELLS WAGGONER

nel location in the region, without loss of human life, personal injury, or major property damage.

—The natural or historic drainage capacity, or its equivalent, for storm and flood runoff on all property in the region;

—The use of major, or 100-year frequency, storm runoff flood-plains and right-of-ways for aesthetic, environmental, recreation, or other multiple-use purposes;

—The preservation of special environmental or ecological features unique to a particular drainage area;

—The current water quality standards of local, state and federal agencies for the South Platte River and its tributaries and in runoff storage and irrigation water reservoirs on those streams;

—The compatiblity of storm and flood runoff measures with current water resource management plans;

—The replenishment of groundwater in conjunction with detention storage, within limits of downstream water rights;

—The reduction of sediment, salt, and other materials carried by storm and flood runoff, without depriving downstream users of needed minerals and other water qualities.

Premises and Principles are needed as guidelines in plan and program preparation. Premises, in this context, form the basis for planning and programming. Principles become guidelines for the technical and other processes involved in plan and program preparation. Thus, planning and programming in a regional context for urban drainage and flood control is based on premises, supplemented by stated principles, as they are affected by certain external constraints.

Premises for urban drainage and flood control are:

—Storm and flood water runoff is a resource out of place.

—Drainage is a space allocation problem.

—Drainage is a subsystem of the total urban system.

—Urbanization changes the natural pattern of storm and flood water runoff.

—An urban drainage strategy includes multiple means to achieve multiple purposes.

Principles for urban drainage and flood control in the Denver region are:

—Storm drainage planning and design shall be compatible with comprehensive regional plans.

—A preventive and/or design master plan shall be prepared and kept up-to-date for each drainage basin in the Denver region.

—Natural drainageways shall be used for storm runoff right-of-way wherever possible and, if feasible, shall be environmentally and ecologically preserved.

THOMAS KRISTOPEIT (DRCOG CHAIRMAN), ELMER CLAYCOMB AND E. G. "TED" MOULDER

BOARD MEMBERS JIM VAN BUSKIRK, ARLEN PATTON AND DAVID CRAN

—Storm drainage problems shall not be transferred from one location to another.

—Flood plains and detention reservoirs shall be used wherever possible to reduce needed channel capacity and expenditures for drainage facilities downstream.

—Major and initial drainage systems shall be planned and designed to be compatible, and to complement one another.

—Irrigation ditches shall not be used as outfall points for major or initial drainage except where supported by hydrualic engineering analysis.

—Runoff storage reservoirs shall be used to prevent damage and minimize downstream facility construction.

—Persons from whose land runoff flows, and persons directly affected by runoff shall share in financing storm drainage improvements.

—All regulatory requirements related to urban drainage and flood control shall be met or exceeded.

The Major and Initial Urban Drainage Subsystem

The physical configuration and function of the drainage system was established long before man's settlement. Nature has, through the years, established a prescriptive easement for the conveyance of runoff water. Man occupies this easement at his own peril, because nature periodically uses it to the detriment of man and his works.

In reality, there are two urban drainage systems, designated the major and initial systems. The *major system* consists of rivers, creeks, streams, gulches, and other channels and storage locations used to collect, convey, and store the runoff from the major storm, commonly considered the 1% probability runoff event. The major system will function whether or not it has been planned and designed, and whether or not improvements are situated wisely with respect to it.

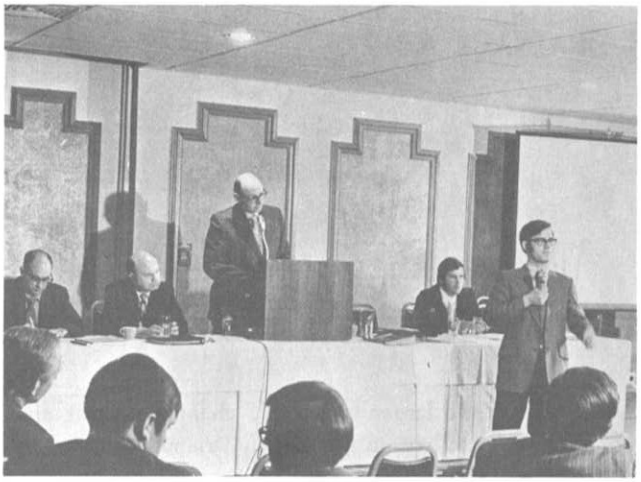
Principal elements of the major system include not only well-defined channels, but also the adjacent flood plains. Well-defined channels are in fact formed, and their regime maintained, by the normally occuring flows. The flood plain adjacent to the channels is required to convey the runoff from the major storm. Management elements of the major system include both structures and regulations necessary for controlling, maintaining, and operating flood plains and channels.

The *initial system* refers to the storm drainage system that is frequently used for collecting, conveying, and disposing of snow melt, miscellaneous minor flows, and storm runoff up to the capacity of the system. The initial system may include features ranging from curbs and gutters to storm sewer pipes and open drainageways.

Understanding the concept of the two systems (major and initial) is essentail in managing the urban storm drainage and flood control element of the urban environmental system. When there is no adequqate outlet for runoff from the major storm, large-scale flooding occurs, resulting in damage to property and danger to life. In addition to pro-

LEONARD RICE, ALAN FOSTER (SPEAKING), KENNETH WRIGHT AND HAROLD BISHOP

BOARD MEMBERS KENNETH MAC INTOSH AND J. IVANHOE ROSENBERG WITH MRS. BARBARA CLEGHORN



(AT TABLE) LEONARD RICE, ALAN FOSTER, TED DIEFFENDERFER AND JACK HAINES. SPEAKER IS LARRY LANG

ENGINEER KENNETH WRIGHT, SENATOR JOE SHOEMAKER, AND ROBERT MCWHINNIE, CHAIRMAN OF UDFCD TECHNICAL ADVISORY COMMITTEE

tecting against the major storm, the major system provides the outlet for runoff collected and conveyed by the initial system.

Interrelationship with the Urban System

When the drainage system is unplanned or inadequate, it can interfere with traffic, damage property, degrade water quality, disrupt commerce and normal urban undertakings, and in many other ways operate to the disadvantage of the urban area. Conversely, a well-planned drainage system can operate to the distinct advantage of the urban environment.

Problem Definition

Problem definition may proceed on the basis of knowing a specific problem exists, or perceiving that problems may exist in a system without knowing specifically where. Both kinds of problems must be analyzed to support problem definition, but in the case of a known problem, such as local flooding, the approach is sometimes more direct. The definition of problems that are only perceived to exist requires a more comprehensive evaluation of each function in the drainage system for deficiencies or inadequacies.

The analysis of known drainage problems begins with knowledge that the design of urban drainage system facilities for both the major and initial systems is related to the degree of protection required, expressed in terms of the probability of storm occurrence. The problems related to both the major and initial drainage systems can be considered in three diffeernt classes:

1) *Urban development proposals*, in which the drainage element must be evaluated for compliance with designed and operating standards and conformance with established plans.

SUMMARY OF MAJOR DRAINAGE NEEDS
(As of January 1972. All Costs in $1000)

County	Preventive Master Planning	Design Master Planning	Facilities Construction	Total
Adams	$ 824	$ 164	$ 10,206	$ 11,194
Arapahoe	408	170	12,733	13,311
Boulder	302	168	16,805	17,275
Denver	27	347	58,178	58,552
Douglas	417	0	0	417
Jefferson	760	211	11,185	12,156
Total	$2,738	$1,060	$109,107	$112,905

DISTRIBUTION OF URBAN DRAINAGE NEEDS

Action	Channel Length Miles	%	Cost ($1000)	%
Preventive Master Planning	910	74	2,738	2
Construction	315	26	110,167	98
Total	1,225	100	112,905	100

2) *Existing problems* that must be further defined in terms of magnitude, cost, and priority. Alternative solutions may be developed and evaluated for final selection and implementation by the appropriate agency.

3) *Potential problems*, that can be identified in terms of location, magnitude, and priority, so that preventive measures can be defined and implemented.

Planning Basins and Project Areas

To facilitate the organization and analysis of the large amount of descriptive and statistical data involved in the development of projects and alternative programs, 398 subbasins of 1000-3000 acres each were aggregated into 10 planning basins. These basins include the St. Vrain River Basin which was removed from the District effective January 1, 1972. Within each basin the prinicipal tributaries were consolidated into logical units on the basis of problem potential ranking, functional status, and physical features for purposes of identifying conceptual solutions to existing or potential problems. Thus a major channel, such as Cherry Creek, having 9 subbasins along the main channel, would be treated as 3 separate reaches for study purposes.

Each subbasin or unit was then examined to determine which uban drainage actions were primarily applicable to the reach or subbasin, and what alternative actions were available. The results of the first analysis defined planning and construction requirements which were combined with planning level cost estimates. Subsequently, a more detailed analysis was performed to further identify alternatives, and refine the planning and construction needs for each individual subbasin or channel reach. The results of this evaluation were then classified by jurisdiction, and planning and construction costs were estimated using unit costs. The cost estimating parameters are based on 1971 levels. No provision for future cost escalation has been included.

Because of the larger number of channel reaches and subbasins included within the Urban Drainage and Flood Control District, and the variety of alternatives available, it was necessary to group channels and areas within each basin into 37 *project areas* for further analysis. Project areas were defined on the basis of location, scope, estimated cost of planning, construction requirements and special considerations.

Thus, a group of channels requiring only preventive master planning might comprise a project, as would Westerly Creek, which is currently being studied by the Corps of Engineers in cooperation with the UDFCD, and the Henry's Lake area, which has been master planned under Project REUSE.

Development of Alternative Programs

To formulate both short and long-range action programs that significantly improve the existing urban drainage and flood control situation, and establish an effective urban drainage management system, it is necessary to define the scope and magnitude of the problem and then develop feasible alternative solutions. By clearly defining the problem, the alternatives available for solution can be evaluated in terms of various external constraints and appropriate priorities.

To facilitate the analysis of the existing situation and formulation of programs and priorities, the District has been divided into principal natural planning basins, and each basin has been further divided into logical project areas. For each project area the current status and future needs have been defined in terms of specific actions. Cost estimates have been prepared and are itemized by action and jurisdiction.

For each project a basic conceptual design has been developed for cost estimating and programming purposes. Alternative programs, representing various levels of District effort and variations in emphasis on different action were

DISTRIBUTION OF AREA, REVENUES, AND MAJOR DRAINAGE COSTS BY COUNTY

County	Percent of District Total		
	Land Area	Annual Revenue	Drainage Needs
Adams	26.0	11.0	9.9
Arapahoe	15.2	12.6	11.8
Boulder	14.8	8.7	15.3*
Denver	8.6	50.2	51.8
Douglas	10.1	0.3	0.4
Jefferson	25.3	17.2	10.8
	100.0%	100.0%	100.0%

*Excluding the St. Vrain Basin.

developed and reviewed in the context of total environmental management needs, and the effects of regional priorities and constraints.

It should be noted that concept costs are based on the total identified *major* drainage needs, as described in the previous sections, and includes both multi- and single-jurisdictional elements. *Initial* drainage system needs and projects identified by local jurisdictions have not been included. In many cases the local jurisdictions may accomplish the major drainage work needed individually, without District assistance.

The concepts presented *are* conceptual only, and are presented in an effort to illustrate the magnitude of work required and implications of various alternative approaches to regional drainage management.

DISCUSSION OF ALTERNATIVE CONCEPTS

CONCEPT I: 1972-74 PROGRAM—

In this concept the planning projects adopted by the Urban Drainage and Flood Control District in the 1972 work program are shown. Because the funds available to the District may preclude accomplishment of all of these projects in 1972, priorities were assigned by the Technical Advisory Committee of the District. By starting the priority I projects in 1972 and the priority II projects in 1973, and extending some projects to 1974 total expenditures can be held to the level provided by mill level revenues and local matching funds.

This concept extends only to 1974 and this does not provide for accomplishment of the total planning needs of the system, or for any construction. To achieve significant improvement in the regional major drainage system it would be necessary to extend the planning effort started in 1972, as shown in concept II, III, and IV.

CONCEPT II: MASTER PLANNING

The basic objective of this concept is to accomplish all master planning, with initial emphasis on preventive master planning, followed by design master planning. If the planning effort is distributed in proportion to revenue contribution by County, and annual expenditures are held to the level provided by mill levy revenues and local cost sharing, it will take until 1982 to complete the presently identified master planning needs, with no allowance for inflation.

In this concept no construction is envisioned as a part of the District program, and when the planning effort is completed in one County, funds are re-allocated to other counties. Because Denver provides the most revenue and has the least planning need (in terms of cost), planning is completed in Denver first. In contrast, Douglas County provides the least revenue, but has a substantial planning need. Thus, if funds are allocated according to revenue proportion, planning in Douglas County is not completed until the 1976 to 1980 period or later.

A program involving only master planning can be accomplished within the present financing capability of the District. It will provide a significant benefit to the system, if implemented by local jurisdictions, by preventing problems in presently undeveloped areas, and by defining solutions to existing problems through design master planning. Under this concept, construction of facilities would be undertaken by local agencies as funds from various sources become available to them. In view of the magnitude of the construction backlog, it is questionable that significant reduction in construction needs could be accomplished under such an approach.

CONCEPT III: MASTER PLANNING AND CONSTRUCTION—ASSUMPTION A—

This is a program designed to complete master planning first, and then undertake construction. Effort has been

ALAN L. FOSTER, DRCOG, DIRECTOR OF PROJECT REUSE

JACK HAINES, LOUIS DUCRET AND LEONARD RICE AT PROJECT REUSE SEMINAR

distributed in proportion to revenue contribution, and as planning is completed in each county, construction would be initiated. In this case, construction would start in Denver in 1974, and in all other counties by 1976. This program anticipates working off the entire construction backlog by 1990 and would involve a significant increase in annual expenditures by 1974. The methods available for increased financing have been explained in detail in a separate report, and will require at least a year or more of lead time for preparation, should such a program be adopted.

Construction included in this program can encompass a wide variety of situations that the District is in a unique position to undertake. Many of the existing problems involve multi-jurisdictional situations that local agencies cannot effectively deal with. Examples of these are reservoirs located in one jurisdiction that provide protection to a downstream jurisdiction, irrigation ditches that transfer storm runoff from basin to basin and jurisdiction to jurisdiction, highway crossings that could be combined or integrated with on-site detention, and channel improvements to eliminate or reduce upstream flooding that may affect an adjacent jurisdiction.

CONCEPT IV: MASTER PLANNING AND CONSTRUCTION—ASSUMPTION B—

This program is similar to Concept III, except that an objective of completing all preventive master planning by 1975 has been established and funds are distributed as required to achieve this objective. Design master planning and construction are then programmed for completion by 1990. This approach involves a significant increase in expenditures in 1974 and subsequent years, involving the same financing and other considerations described in Concept III.

Although the allocation of effort and expenditure of funds has been determined by County for each of the Concepts discussed above, the accomplishment of both planning and construction can be achieved more logically and efficiently if undertaken on the basis of Planning Basins and Project Areas, as described previously. Because the natural major drainage system is organized by basins, the planning and design of solutions must be based on the physical basin boundaries rather than political boundaries. The cost of urban drainage needs varies considerably between basins, indicating that a basin approach would also provide the most equitable method of financing drainage improvements.

REVOLUTIONARY CHANGES COMING—Continued from Page 2

Ponding will be more important than ever because of the future need to treat storm runoff. Treatment of large rates of runoff is costly and wasteful. Ponding will reduce peak flows to more manageable rates of flow. Treatment will be aimed at the six-month and one-year frequency runoff; obviously not the 5-year runoff, which would be just too much to handle.

On-site ponding is practical and cheap. Some industrial plants such as the new Samsonite plant in Denver have adopted rooftop ponding on their own initiative. We as a group should work towards an on-site ponding ordinance for the Denver Metro Area. I would like to see this conference support an on-site ponding ordinance.

Upstream ponding has been stressed heavily in the Urban Drainage Manual. It has been implemented and is being enforced in the downtown Denver Skyline Urban Renewal Project. Nobody has objected. It works well. Little else on upstream ponding is being done, though, outside of Boulder, Colorado.

We need to use natural terrain, existing man-made facilities, and grassed areas along our streams and in park areas and elsewhere to slow the runoff, to detain and store the runoff and to reduce the hydrograph peaks.

If we use urban water management principles in our drainage work, and if we remember the three public works environmental planning principles, and plan and design with nature, we will be enhancing our urban areas and will leave a better place for our children. In addition, it will make public works engineering and administration much easier for those who follow us in the next decade or two.

MEET THE BOARD MEMBERS

Working to Protect You and Your Property from Floods

JAMES J. RICHEY
Representing City of Lakewood

A public-spirited businessman, James J. Richey was born in Atchison, Kansas, on July 15, 1926, and attended schools there.

After attending the University of Kansas where he obtained a degree in Business Administration in 1947, he immediately became associated with Procter and Gamble where he has had increasing levels of responsibility, with the present being that of Region Manager for parts of twelve Western States.

While attending K. U. he was active in all athletics.

The Richey family moved to the Lakewood area thirteen years ago. They are members of the Lakewood United Methodist Church.

Mr. Richey is a former member of the Jefferson County R-1 School Board. He was a co-chairman of the incorporation effort for what is now the City of Lakewood.

He and his wife, Betty, have four children: Kathy (Mrs. Bruce Vaughan) of Boulder; Nancy, who is with the Marketing Research Division of Proctor & Gamble; Jeff who is a Freshman at Northwestern University; and Robyn who is in the 5th Grade at West Lakewood Elementary School; and two granddaughters.

His primary hobby (when schedule permits) is golf.

DAVID CRAN
Representing Adams County

An Iowa-born businessman with growing responsibilities in public affairs, Dave Cran lives in Northglenn with his wife, Jaci, and children Christopher and Shondra. He was born at Humboldt, Iowa, in 1936.

He was educated at Fort Dodge Junoir College in Iowa and the University of Colorado at Boulder. His business is the Hawkeye Development Company dealing in fast food outlets and entertainment.

In addition to being a member of the Adams County Board of County Commissioners, Dave Cran is a representative to the State Board of Social Services, welfare representative to the County Commissioners' Assn., is on the Consulting Committee to Advise the Colorado Representatives, the Multi-State Tax Commission, is a representative to the Adams County League of Cities and County, and a member of the Adco Chamber of Commerce.

In addition to enjoying skiing as a hobby, Dave Cran is a dog fancier, breeding pure-bred dogs. He is a member of the Great Dane Club of Greater Denver, and a member of the Colorado Kennel Club.

DAVID A. CURTIS
Representing Douglas County

A lifetime resident of Douglas County, Curtis lives near Sedalia on the same home ranch his great-grandfather homesteaded in 1871. He and his wife, Carol, have three children: David, Pamela and Jonie. Dave was born in 1928.

After attending public schools in Douglas County, Dave went to Colorado State University and has engaged in farming, ranching and the saw mill business. He has been interested in flood control and has extensive soil conservation projects on his ranches in Douglas and Arapahoe Counties.

He is on the Douglas County Soil Conservation District Board, an Elder in the Sedalia Presbyterian Church, active in the Young Farmer and Homemakers Club, the Farm Bureau, the Douglas County Cattlemens Assn., and the Colorado Cattlemens Assn.

Governor John A. Love appointed David Curtis in September, 1971, to fill out the unexpired term of Henry Kimbrough, who resigned, on the Board of the Urban Drainage and Flood Control District.

JAMES R. VAN BUSKIRK
Representing Boulder County

The Chairman of the Board of County Commissioners in Boulder County, Jim Van Buskirk is a businessman whose parents were both professional educators, and two of his five daughters are now school teachers in the Denver area. Two other daughters are attending high school in Broomfield, and another attends the University of Denver.

Born in Liberal, Kansas, in 1924, Mr. Van Buskirk attended schools there followed by enrollment at Friend University in Wichita and Washburn University in Topeka.

He represented the International Shoe Company as wholesale representative for the state of Nebraska for seven years, and established clothing and shoe stores in several Nebraska cities. Since 1957 he has been engaged in real estate and building, with his office at Broomfield.

In addition to his work on the Executive Committee of the UDFCD, he is a general partner in the Rio Blanco Land & Cattle Co. of Meeker, Colorado. He is a member of the advisory board of Boulder Memorial Hospital, the Elks Lodge of Boulder, and the Methodist Church and Rotary Club of Broomfield.

Some Legal and Financial Aspects of Flood Control

by SENATOR JOSEPH SHOEMAKER, *Attorney*
Schneider, Shoemaker, Wham, and Cooke

[Excerpts from luncheon talk during REUSE Seminar.]

This is an opportunity to reconsider what is in the statute which created the Urban Drainage and Flood Control District, and to refresh our thinking concerning the solutions that are possible within the language of the statute.

Every conceivable tool to solve these problems has been provided by the General Assembly.

Project REUSE has been a great thing and I think Jim Quinn deserves great credit for convincing the Board to fund this project, together with the Denver Regional Council of Governments, and HUD.

Project REUSE is great because it defines the problem like it has never been defined before. Al Foster and Lee Rice have done a super job in coming up with material that the average lay citizen will understand and appreciate when it is presented to them by the respective local jurisdictions and by the District.

I think this District will be far ahead of any other area in solving such problems. However, as we all know, the man sitting up on the hill still doesn't believe he has a problem.

I would like to call your attention to certain sections in the statute; these statutes require public hearings. To solve the drainage problems that have been indentified for us by REUSE it takes planning, and part of planning is making sure that the public is involved. If the public is involved they will understand the problem, and they will then understand the solution that is being suggested; then they won't mind so much paying what it will cost for the solution.

We can approach this by breaking it into three parts:

A. A Comprehensive Plan (with Public Hearings)
B. A Comprehensive Program (with Public Hearings)
C. Implementation of the Program (by Public Vote)
D. Contracts.

(Concerning A, the Comprehensive Plan, Senator Shoemaker read from Section 23 and 24 of the Act which created the District. He explained how the Board has used these provisions for the work done so far in the field of comprehensive planning and coordination of various activities, in cooperation with local jurisdictions. He showed that the Model Flood Plain Ordinance adopted by the District has been recommended as a tool to be used by the local authorities, and he mentioned that a model on-site ponding ordinance could be promulgated in the same manner.

(On B, a Comprehensive Program, Senator Shoemaker read from Sections 3 and 19 of the Act. These deal with acquistion of facilities when a comprehensive program may be adopted by the Board, following public hearings.

(On C, Implementation, which calls for specific funding of programs and facilities, he pointed out that public support is called for because tax dollars will be required, and such expenditures must be authorized by a vote.

(On D, Contracts, he showed that these must be undertaken cooperatively and on a multi-jurisdictional basis, as carefully defined in the statute. These Contracts require acceptable specific engineering solutions to problems, with full consideration for environmental effects, and alternative proposals.)

The legal and financial implications of drainage projects will be considerably lessened if maximum use is made of flood plain zoning, on-site ponding, and developmental standards.

WHY:

Because these are planning tools: If proper planning is done, which includes letting the general public in early, then drainage and flooding problems will be considerably lessened.

"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
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