

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

## FIELD TRIP AND CRITIQUE

### Steps Undertaken to Resolve Drainage Problems Revealed by Close-Up Inspection

During July the Urban Drainage District held its first annual two-day Field Trip and Critique. The tour was well attended, with both local and out-of-state professionals among those who participated.

Need for such a trip was expressed during the first Symposium on urban drainage problems, which was held in Denver late in January. Objective of the two-day trip was to provide an opportunity for first-hand inspection of selected problems and treatments within the metropolitan area.

Sites in and around the city of Denver were inspected the first day of the field trip. The second day the group visited locations in and near the city of Boulder, and various areas in Adams County.

One of the major visits during the first day's tour was at the Chatfield Dam and Reservoir, southwest of Littleton, Colorado. This \$85 million project currently is scheduled for operative completion late in 1974 or early 1975.

The huge Chatfield structure will provide protection for Littleton, Englewood, Denver, and downstream localities from floodwaters of the South Platte River and/or Plum Creek originating in the mountains and foothills to the south and southwest. It was in the Plum Creek drainage area that the thunderstorm struck in June, 1965, resulting in more than \$350 million worth of damages to the Denver metropolitan area.

Mr. Buryl Glasser, resident engineer at Chatfield, began the tour with a description of the total project, including its history. It was noted that considerable public pressure had been applied immediately following the 1965 flood to provide some means of keeping such a disaster from happening again.

Following this discussion, the attendees were treated to a two-hour bus tour of the Chatfield complex. After being shown the general area, with a stop at the outlet works (presently under construction), the party was driven to an area where the contractor was moving dirt in the building of the large earthen dam.

Earth-moving machinery, including some new monsters capable of carrying in excess of 30 cubic yards at one trip, are moving one million cubic yards per month during this summer. Construction crews are working five 10-hour days and one 8-hour day per week in this massive effort to take advantage of the good weather and accessibility of earthfill from the general location of the dam itself.

Following the Chatfield tour the field trip party visited a plant in the Littleton area where concrete pipe is manufactured. This included inspection of a new machine producing 60-inch reinforced concrete pipe.

In the afternoon, the first stop was at the Cherry Creek Dam and Reservoir situated in the southeast portion of the metropolitan area. This well-planned unit, also built by the U.S. Army Corps of Engineers, was completed in 1950. It is credited with having saved an additional \$100 million worth of damages during the 1965 flood,

(Continued on Page Three)

#### BOULDER SEDIMENTATION POND INSPECTED BY FIELD TRIP PERSONNEL ON SECOND DAY



The  
URBAN **UD** DRAINAGE  
&  
FLOOD CONTROL DISTRICT

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KENNETH D. MITCHELL  
*Representing City of ~~Aurora~~ Brighton*



Twice Mayor of Brighton and a member of its City Council four terms, Ken Mitchell was his city's "outstanding man of the year" in 1969, the year he was named to the Urban Drainage District Board by the Governor. He has also been Vice Chairman of the District's Board since 1969.

For 20 years Mr. Mitchell has been employed by Rocky Mountain Arsenal. The 40-year-old native of Adams County has been a planning board member for six years. He is married and has two teen-age daughters. An active sportsman, he has been president of the Brighton Rod and Glun Club for two years.

Making drainageways "community assets instead of just ditches to carry water" is an interest that engages much of Ken's spare time. He hopes to initiate action for more NYC programs to produce a pleasing environment while achieving flood control, furthering the Adams County concept of flood plain management.

HENRY C. KIMBROUGH  
*Representing Douglas County*



For the past six years Henry Kimbrough has been a member of the Douglas County Board of Commissioners from which he is resigning soon. In addition to serving the Urban Drainage District as a member of its Board he is also its Secretary. He is on the Board of Regional Transportation District, and active in the County Commissioners Assn. He served two years on the State Industrial Commission.

Henry has held a number of positions in the State Capitol and currently is Administrative Assistant to the Lieutenant Governor. He has had many years of experience in the management of private resort hotels in Colorado, California, Washington and Florida. While residing in California he was a school board president. He attended public schools in California, and was a student at the University of Southern California two years.

While living at Castle Rock, Colorado, Mr. Kimbrough has been president of the Lions Club and a member of the vestry of Christ Episcopal Church.

**U.S.G.S. Proposes Joint Effort**

The U.S. Geological Survey has proposed a continuing program with the Urban Drainage District for Fiscal Year 1972.

The program represents a continuation of data gathering and evaluation involving the thirty small watersheds on which the District and U.S.G.S. have installed rainfall/runoff gages. These gages were installed over a period of years and represent an effort to identify urban runoff on small watersheds.

The program for Fiscal Year 1972 will involve a Drainage District contribution of \$13,000, with the U.S.G.S. contributing the same amount. The contract will include a detailed description of those basins to allow the development of models for calculating urban runoff characteristics.

# Field Trip

(Continued From Page One)

by holding back flood waters from Cherry Creek and its tributaries.

Mr. Jack Unitt discussed the Cherry Creek Dam and Reservoir, describing its use both as a flood control measure and as a center for recreational activities. Following this question-and-answer period, the Field Trip party visited Harvard Gulch.

The Harvard Gulch Project is the most recently-completed of the major flood control facilities in the City of Denver, and it has received considerable acclaim as an outstanding example of urban drainage technique. It was

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## AERIAL VIEWS OF THE \$85 MILLION CHATFIELD DAM AND RESERVOIR PROJECT UNDER CONSTRUCTION



financed by a levy imposed upon the entire City of Denver, and provides both open space and effective flood control for an area which had been threatened almost yearly by flooding in southeast Denver. At Harvard Gulch, the discussion was led by Ken Wright, designer of the Harvard Gulch Project and engineering counsel for the District. The inspection party walked the length of one of the major areas which included a detention pond, a small spillway, and the entrance to the culvert leading to the Platte River outfall.

Another portion of the Field Trip took place the second day, when the party traveled to Boulder. There Ted Dieffenderfer conducted the tour which gave the attendees an opportunity to inspect some of the major flood control projects in the Boulder area.

## MOVING ONE MILLION CUBIC YARDS OF EARTHFILL PER MONTH REQUIRES CONSTANT TRAINS OF MAMMOTH EARTH-MOVING MACHINES, ON CHATFIELD DAM COMPLEX



It is to be noted that Boulder is one municipal entity which has achieved significant results in its program of flood control. The City of Boulder has master planned its area, and the City Council has designated sixteen of the major drainageways in the area as flood plains.

The Field Trip party moved to the northwest of Boulder to inspect a sedimentation pond demonstrating a technique by which more than one thousand cubic yards of sediment from the mountain areas has been captured successfully during periods of heavy rainfall and spring runoff.

Luncheon for the Field Trip party was hosted by a concrete pipe manufacturing company which has a plant located north of Denver. The party was given a tour of the plant and witnessed the manufacture of 36- and 42-inch reinforced concrete pipe under different circumstances than those of the previous day's tour.

Later the group inspected a flood plain development project along Clear Creek, being carried on under the sponsorship of Adams County and the Urban Drainage and Flood Control District. This is the program involving work by poverty-level young people supplied by the Neighborhood Youth Corps. With their help, the District is assisting in the development of a wild bird sanctuary, a parking area, picnic facilities, and a lake for fishing. The total effort is a demonstration of some proper uses of a flood plain, as opposed to unplanned intrusion of residential or commercial developments wherein property and possibly lives would be jeopardized during times of high water.

This project in Adams County covers more than 100 acres and is considered one of the outstanding examples of a summer work program under the SPARE concept as proposed by the Environmental Protection Agency.

Enthusiastic response to the Field Trip by those who participated indicates that comparable trips should be programmed in future years. There seems no better way to provide a close-up inspection of some of the problems of the area and also some of the better techniques being developed to prevent flood damage and to make the most desirable use of those all-too-plentiful areas now recognized for what they are in reality—flood plains.

— JRQ

# NYC Boys Beautify Drainageways in Metro Denver Summer Work Program

Improving the environment by healthful outdoor work has been the assignment of some 35 different boys during the past summer, yielding permanent improvements that can be seen in various parts of the Urban Drainage and Flood Control District of the metropolitan Denver area.

The District sponsored the work program for youths from disadvantaged families in cooperation with authorities of Adams County, Denver, Littleton and Englewood.

The Denver area activity is a unit of the nationwide SPARE program (Summer Program for Action to Renew the Environment). This is an interagency cooperative effort in more than 100 cities conducted by local agencies in cooperation with the Environmental Protection Agency and the Neighborhood Youth Corps of the U.S. Department of Labor.

Meaningful work experience for the young people is provided, focusing on improvement of natural and man-made environments in communities where the boys and girls live. Some understanding of ecology is supplied while giving the young people a glimpse of career opportunities in environmental fields such as flood control, water and air pollution prevention, waste disposal, health concerns and conservation of many types as needed in metropolitan neighborhoods.

The Denver area program sponsored by the Urban Drainage District and cooperating local agencies focused on environmental improvements at various locations on the South Platte River drainage. James R. Quinn, the District's director, praised the leadership provided by Ben Raizen, NYC Denver office director; Rogers McAllister, summer NYC project director, and Dick Vaughn, from Adams City High School faculty, who supervised the work done on Clear Creek in his community.

The major work was done adjacent to Clear Creek in Adams County between Commerce City and Westminster, developing a new park and recreation area beside State Highway 224 and Interstate 80 South. Here a fishing lake was improved with walkways provided along the banks, picnic areas were established under some large trees, and other facilities were developed to provide an attractive recreation area where such accommodations had been lacking.

Each of the boys, mostly Blacks and Chicanos, put in a total of 234 hours during the summer SPARE assignment, winding up in time to return to school early in September.

The Denver project unit was handled through the Department of Public Works, giving the boys experience in flood plain modification along Sanderson Gulch. The cities of Littleton and Englewood has similar units em-

ploying NYC boys on environmental improvements along various major gulches and ditches.

An inspection of the SPARE work being done in August was provided by Miss Leslie Slovotsky, a summer interne employed by the Kansas City office of the Environmental Protection Agency. She visited EPA programs in the Rocky Mountain and Midwestern states, reporting directly to the Washington office. Miss Slovotsky is a graduate of the University of Southern California.

Directors of the District authorized investment of \$15,000.00 as its contribution to the NYC projects, specifying that the undertaking be considered a pilot project to be evaluated with a view to incorporating such activities in a comprehensive summer work program for 1972. The directors stressed that it not be a "make-work" project concerned with merely picking up trash, but one yielding lasting improvements of significant value in proper use of flood plains and other aspects of flood control. Major funding for the work came from the NYC division of the U.S. Department of Labor.

The pictures on the opposite page show scenes in Adams County during the work program when NYC boys were developing the park area and fishing lake. In addition to the pick-and-shovel work done by the young people, developing pathways around the fishing lake and other such environmental improvements, use was made of a bulldozer and other powered equipment to grade and level picnic areas, clear out underbrush, trim trees and otherwise beautify the park area.

Planning already has started for a list of proposed projects of similar nature which might be undertaken during the summer of 1972, if NYC (SPARE) help is available to work with cooperating local agencies throughout the District. Work proposed will include reshaping stream banks and slopes, development of picnic areas and recreational trails, construction of coffer dams on smaller streams, brush removal and tree trimming, and a wide variety of environmental improvements in which the participating young people can gain meaningful work experience under the direction of supervisors schooled in modern ecological concepts.

In addition to the agencies mentioned as participants in the SPARE program, others making major contributions include the Environmental Education Task Force of HEW (Department of Health, Education and Welfare); HEW Manpower Office; U.S. Office of Education, U.S. Army Corps of Engineers, and major environmental groups including the Sierra Club and the Isaak Walton League which participated in drafting the original SPARE concept and program.





Youth Corps Develops Recreation Facilities in Denver Metro Unit of SPARE Program

# Board Approves Contract for Consulting Services of R. W. Beck and Associates

For more than 20 years many of the nation's leading public utility firms have relied on the professional engineering services of R. W. Beck and Associates. The firm has offices in Seattle, Phoenix, Boston, Orlando (Florida), and Columbus (Nebraska), as well as in Denver. Paul R. Cunningham is Principal Engineer, and D. E. Burroughs is partner and manager of the Denver Regional Office.

Many months of study by the Board of the Urban Drainage and Flood Control District preceded appointment of the Beck firm to recommend funding procedures and progressive financing steps for the District's operations in the years ahead.

The Beck firm employs more than 220 professional engineers and other specialists providing engineering, analytical and related services throughout the United States and abroad. In the specialized field of long-term bond financing and feasibility studies R. W. Beck and Associates have supplied guidance for more than \$3.5 billion worth of projects.

In addition to other projects throughout the United States most of them financed by major investment banking institutions, the Beck organization has handled a number in the Rocky Mountain area. These include the Aurora (Colorado) Water System Expansion Program, and a series of utility financing programs for conventional and nuclear plants in Nebraska totaling more than \$139 million.

Among the dozens of rate studies the firm has conducted on utilities, water and sewer systems have been those for the Colorado cities of Boulder, Greeley, Fort Collins and Longmont. A great many projects of varying magnitude for storm sewers, drainage basins and related facilities have come within the scope of the Beck engineering studies.

## TO ASCERTAIN BEST METHODS OF FINANCING

The Beck organization has been charged with the specific assignment of developing a sound basis for financing the improvement programs of the District. This is an important element in formulating the District's long-range plan for serving the Denver urban area.

Annual fixed and operating costs must be adequately provided for through rates, fees or service charges. This calls for accurate forecasts of annual expenses for projects as they are developed and become operational.

The orderly development of the District's program also requires projections of District expenses on a preliminary basis for a planned five-year program of urban drainage projects.

Comparing financing alternatives, the study is based on the fact that the District is empowered to levy taxes, assessments and "cause to be collected rates, fees and other service charges. . ." The maximum annual nondebt levy established by law is 2.5 mills, with a maximum of 1.0 mill to defray costs of capital improvements, and 1.0

mill to accumulate funds for payment of assessment bonds. Consideration of all alternatives for financing must lead to determination of the most equitable, workable method, consistent with the constraints of the enabling legislation.

## CONSIDERATION OF SERVICE CHARGE

In particular, the service charge alternative is to be viewed from all angles since it appears to be the most promising method of financing for the District. Details of the method of establishing such a charge must be developed to determine a basis for charges to citizens within the District's boundaries who either have no present assessments of any kind for urban drainage facilities or who are already paying a fee to another agency. Prime considerations involve fairness, ease of administration, and implementation within the framework of existing agencies.

After a thorough review and up-dating of urban drainage projects needed, with priorities and construction costs, these must be matched against projected revenues within the limitations of realistic financing. Construction of those projects with highest priority and economic feasibility is to be based on a five-year program, probably calling for annual capital requirements in the range of \$2 to \$4 million.

Along with recommended financing is to be a plan for administration of the service charge, if that should be selected as the best financing method. This plan must be made with sufficient detail and attention to regional consideration as to gain the maximum degree of acceptance among those citizens and agencies who must pay or administer the collection of the service charge.

The consulting firm would be available to assist in information and orientation sessions to publicize the plan and to help provide the understanding that will lead to its acceptance by those who will "foot the bill."

## BACKGROUND OF PAUL R. CUNNINGHAM

Approval of the Beck contract by the District Board was in a measure an expression of the Board's confidence in Mr. Paul R. Cunningham, Principal Engineer.

Educated at the University of Texas and Midwestern University, Mr. Cunningham has a B.A. in Mathematics and B.S. in Civil Engineering. He is a registered professional engineer in Texas, Colorado, and Louisiana. Since starting his practice in 1957 he has specialized in the study and design of water resource projects.

He has participated in and directed regional hydrologic studies of water resource systems, integrating surface and ground water supplies to determine the optimum location and size of reservoir complexes. He has performed flood routing studies, spillway design and tail-water analyses. His work has included computer modeling of several river basins and sub-basins including analyses of historical and future flows, depletions, effect of water rights, water quality and multipurpose uses. He is active in leading professional organizations in his field, and has to his credit many publications involving techniques for the use and control of water.

# QUINN-TESSENCE

BY JIM QUINN

*Plain Talk from the District's Executive Director*



## SOME THOUGHTS AT BUDGET-MAKING TIME

One of the major considerations that always faces an organization as it looks at next year's budget is the fundamental question, "What is the purpose of THIS organization?"

All too often we become carried away with the idea of trying to develop a budget or a program that will seek to perpetuate the on-going characteristic of the organization, rather than reflecting on whether or not the organization has a purpose, and, secondly, whether that organization is seeking to achieve that purpose through its regular activities.

Those organizations which depend on public monies for their support often become involved in a program that will provide some solutions on a geographic basis. This tends to keep all entities supporting the enterprise reasonably happy, while the organization performs enough of an operation to justify another year's budget. Many a budget, unfortunately, is prepared without the over-riding concern as to whether or not the enterprise is really serving its purpose, whatever that purpose may be.

This doesn't mean that mere statement of goals or objectives is sufficient basis to use as a budgeting method. On the contrary, the reflection must go deeper than merely stating objectives. It must be involved with the underlying purposes that caused the establishment of the organization.

A regional Special Purpose District such as the Urban Drainage and Flood Control District, has as one of its underlying principles the fact that certain problems must be alleviated on the basis of a *regional* approach, rather than by the individual municipalities or counties acting separately and independently. It must also perform the task better than a loose association of municipalities or counties such as might be arranged for an attack on the same problems. For handling certain functions, there is need for a District endowed with sufficient power to generate its own funds, along with sufficient power to regulate and control certain matters for the alleviation or solution of stated problems on a regional basis.

The effectiveness of the program of such a District, despite the particular powers granted to it, will still depend upon the District organization's ability to function within the framework of the cooperating local entities. If such cooperative effort is not a significant part of the District's program, it will soon appear as an attempt to insert a new layer of government between the municipality or county and the state government. This proliferation of levels of government is not the most effective method of solving problems (this could be the understatement of the year); in the final analysis, these problems can be solved only if the local entity is involved as the originator or implementor of the steps taken by or through the regional agency.

## SECOND ANNUAL SYMPOSIUM BEING PLANNED

Plans for the Second Annual Symposium on Urban Drainage are being formulated. Like the earlier event, this will be held under the sponsorship of the Urban Drainage District. It will take place early in February, 1972. Details will be forthcoming in the near future as to dates and place, content and scope of the two-day study session.

Topics slated for discussion include the potential of the ponding-recreation concept, as proposed in other areas of the United States, as well as a master basin planning effort as a single-phase concept for solution of drainage problems.

Advance registration materials will be mailed within the next four to six weeks to those who have indicated interest. If you are not on the mailing list, please address the District office for your copy of the advance information.

## HUD AND ARMY ENGINEERS EXPLORE COMMON GROUND

Information coming to us indicates that the U. S. Army Corps of Engineers and the Department of Housing and Urban Development (HUD) are seeking to develop a common understanding concerning their areas of responsibility on drainage and flood control projects in metropolitan areas.

Under the formula suggested, it would seem that the Corps of Engineers would deal with all of those floods in excess of the 10-year level and would perform its regular services in this regard. HUD then would become involved with the development of facilities and considerations designed to handle all storms of flood-causing stature up to and including the 10-year downpour.

One comment relating to such a program has been voiced by groups familiar with the discussion. The problem, they say, hinges on the limited amount of money available to HUD for drainage and flood control work. It would seem only logical, they say, in view of what money has been available heretofore, that HUD begin establishing "significant need" categories that would justify a sharp increase in the amount of money available under HUD programs for drainage and flood control.

Most of the HUD regulations drawn to date have been concerned only with sanitary sewers, and focus very little attention on the assistance that could be made available to prevent flooding in urban areas up to and including the 10-year storm. Guidelines and ratings will need extensive revision to assure comparability of drainage projects in HUD funding.

It might be well for those who are involved in these decisions to conduct some conferences or hearings which would involve representatives of urban areas facing the problem of insufficient funds for drainage construction. Such discussions might be a means of establishing a rate of funding adequate for HUD to assume this particular role to assist cities and major urban areas.

## REUSE Project Yielding Tangible Results

REUSE (Renewing the Environment through Urban Systems Engineering) is now in its third quarter of operation. The data being developed show significant information which will be of continued use to the Urban Drainage District.

This joint project of the Urban Drainage District and the Denver Regional Council of Governments deals with the elements of urban drainage and solid waste disposal. Urban Drainage sub-contractor on the project is Leonard Rice Consulting Water Engineers of Denver.

First significant output for urban drainage was the preparation of thirty U.S.G.S. 7½ minute quadrangle maps. Each of these maps outlined the ridge lines (dividing lines) between drainage basins. Arbitrary minimum size basins were established at 1000 acres. A total of nearly 400 basins were identified and placed on reproducible mylar maps.

These maps are now being used by planners and engineering staffs in the counties served by the Urban Drainage District. For the first time there is a continuum in the base data for drainage throughout the 1363 square miles of the Urban Drainage District. Mylars are available for reproduction at the expense of the borrower from the Urban Drainage District's offices.

Land developers and planners will find the maps useful in identifying the drainage basins and the outfall point. These data assist in the establishment of traffic patterns and the layout of building sites within the given development area.

Refinement of the map data began almost immediately. The first step in the process was a verbal description of the drainage basins. The description included all known geographic features along the drainage course.

The second stage of refinement was the establishment of a sub-basin summary sheet for each of the basins. This summary sheet listed, in cryptic form, data of value to professionals in the development of the drainageways.

Included in these data are the major basins and tributaries. Correlation is done through a numbering system which can be computer oriented.

Additionally, the summary sheet includes areas, length, slopes, and degrees of previousness. These items are used in the calculation of runoff characteristics utilizing the Drainage Criteria Manual.

Also included on the summary sheet are evaluations of the status of both the channel and the development of the flood plain.

Out of this information has come an evaluation or classification of basins. The classification is done in two areas; the status of basin development and the status of the channel itself. Arbitrarily, the researchers established four values in flood plain development and five values for channel status. The combined classification yields twenty numerical degrees of problems.

The above information is now in the process of review through the major contractor, Martin-Marietta Corporation, the Council of Governments, and the Drainage District. It is expected that the information will be made available to public officials in the near future, with a potential of being included in later publications as a major contribution to the planning and engineering of development within the area served by the Urban Drainage District.

One of the major advantages to the development of this detailed information is the availability to analyze the need for solutions to drainage problems. With a classification based upon development and channel condition, the District can identify those areas of greatest need as well as identify those areas where zoning or flood plain regulations can be applied to assure protection of the flood plain.

The information from these studies will form a sound basis for the District Board to use in the development of the long range multi-year effort to solve the drainage problems of the Metropolitan area.

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

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