



Urban Drainage and Flood Control District

SUSTAINABILITY ON A LARGE SCALE

Action: In 1972 the Board of Directors of the Urban Drainage and Flood Control District decided to pursue a two-pronged approach of remedial and preventive actions to contain flood losses.

Outcome: The population of the District has tripled since the action described above but there are 5000 fewer structures (units) in the mapped 100-year floodplains than there were in 1970.

April, 2010

Introduction

In 1965 the Denver metropolitan area was hit with a devastating flood on the South Platte River. Following the flood an organization of county engineers began meeting to find ways to address drainage problems that crossed jurisdictional boundaries. By 1969, they had enlisted an influential state senator to draft and introduce the Urban Drainage and Flood Control Act in the Colorado General Assembly. The story goes that the act was stuck in a committee and likely headed for defeat when the 1969 South Boulder Creek flood occurred in Boulder. Following that event the legislation passed.

The legislation established the Urban Drainage and Flood Control District for the purpose of assisting local governments in the Denver metropolitan area with multi-jurisdictional drainage and flood control problems. The District boundaries have changed since the original legislation, and it now covers an area of 1608 square miles and includes Denver, parts of the 6 surrounding counties, and all or parts of 33 incorporated cities and towns. There are about 1600 miles of "major drainageways" which are defined as draining at least 1000 acres. The population of the District is approximately 2.7 million people.



Governing Body

The District is an independent agency governed by a twenty-three member Board of Directors. The make-up of the Board is unique, in that twenty-one members are locally elected officials (mayors, county commissioners, city council members) who are appointed to the board. These twenty-one members select two registered professional engineers to fill out the Board.

Funding

District funds come from four different property tax mill levies. The mill levies are earmarked for specific programs that are detailed in the following sections. The total mill levy cannot exceed one mill.

Staff

The concept of the District is to keep the staff small and to utilize private consultants and contractors as much as possible. As a result the District operates a \$22 million annual program with only 23 full time employees and 8 part-time college student interns. The staff is responsible for management of all project funds; supervision of all work done by consulting engineers; and coordination of all planning, design, construction and floodplain management efforts with local governments.

Mission Statement

“The Urban Drainage and Flood Control District works with local governments to address multi-jurisdictional drainage and flood control challenges in order to protect people, property, and the environment.”

Programs

The District operates four programs: Master Planning; Floodplain Management; Design, Construction and Maintenance; and Information Services and Flood Warning. A brief description of each program is provided later.

Sustainable Growth

The 1969 legislation which established the Urban Drainage and Flood Control District gave the District fairly broad powers but very little money to implement those powers. Initially, the District was authorized to levy 0.1 mill for planning and operations, which amounted to approximately \$400,000.

The first major activity of the District was to inventory drainage basins and sub-basins to determine the extent of problems and to develop a plan to attack those problems. The initial study indicated that approximately 26% of the major drainageway miles within the District were developed, with the remaining 74% undeveloped and amenable to preventive approaches.

It was logical to consider that, if effective preventive measures could be undertaken on the undeveloped drainageways, significant savings in future remedial needs could be realized. In probably the most important policy decision in its history the District Board made a commitment to develop a comprehensive floodplain management program to prevent new problems from being created by new development, while “fixing” existing problems. Since 1969 the population of the District has tripled, and yet we estimate that there are 5000 fewer structures in mapped 100-year floodplains. This was a major decision to promote sustainable development years before sustainability became a prominent consideration.

The Board also realized that the South Platte River, the backbone for the drainage system for the entire Denver Metropolitan Area, was so large and had so many problems that it could absorb all of the District's time, effort and money. Therefore the Board decided initially to emphasize work on tributaries to the South Platte River.

Vision Statement:

Achieve a sustainable network of safe, efficient, and environmentally sensitive drainage and flood control facilities to best serve an urban community that is aware of its flood risks. Lead the region and the nation by implementing innovative thinking and technology and by promoting wise use of public and private lands, while providing unsurpassed service to the community.

In 1973, following four years of problem identification and master planning on some of the most heavily developed tributaries to the South Platte River, the Board requested authority to levy an additional 0.4 mill for a design and construction program. The legislature granted the request, beginning in 1974. Also in 1974 the Board established the floodplain management program, to be funded out of the original 0.1 mill.

In 1979, the Board requested a 0.4 mill increase for maintenance and preservation of floodplains and floodways. The legislature approved the request for a three-year trial period from 1980-83 after which it was extended indefinitely. By 1980, the District had been authorized to levy up to 0.9 mill for the following

purposes: General Fund (operations, Master Planning Program and Floodplain Management Program) - 0.1 mill, Design and Construction Program - 0.4 mill, and Maintenance and Preservation Program - 0.4 mill.

With several years of experience and many master plans and construction and maintenance projects completed or underway, the District turned to the South Platte River. A master planning study for the 40 miles of the river through the District was completed in late 1985. Using the master plan as a basis for its request, the Board sought an additional 0.1 mill authorization from the legislature (excluding Boulder County) for funds to be earmarked for the South Platte River, and that request was approved in 1986.

The District became involved in urban stormwater quality after Congress amended the Clean Water Act in 1986, requiring local governments to improve stormwater quality. The District has assisted local governments in preparing National Pollution Discharge Elimination System (NPDES) permits; and in planning, constructing and maintaining stormwater quality facilities. The District has also conducted stormwater quality research and developed best management practices, among other stormwater quality activities.

The District now has a comprehensive program addressing all aspects of flood management, a set of tried and proven policies and procedures, and a reasonable and reliable level of funding. Details of the individual District programs are provided in the following sections, with emphasis on the sustainable activities.

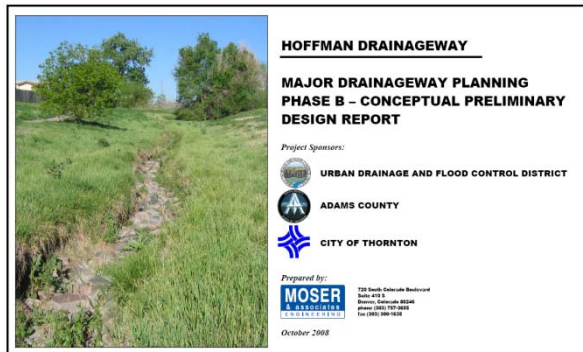


Master Planning Program

The Master Planning Program is funded out of the original 0.1 mill authorization for the District. Key policy decisions which guide the program implementation are as follows: (1) Each master planning effort must be requested by the local governments and must have a multi-jurisdictional dimension; (2) Master plans are completed by consultants acceptable to all local project sponsors and the District; (3) The District will pay up to 50% of the study costs, with the local sponsors sharing the remainder of the costs; and (4) The master plan must be acceptable to all the affected local governments.

The program has evolved into four major areas of interest: (1) Master planning, including major drainageway master planning and outfall systems planning; (2) Drainage criteria manuals for local governments and the District; (3) Support of local government stormwater NPDES discharge permitting efforts; and (4) Special projects, such as developing and maintaining criteria and technical information for stormwater quality and quantity best management practices, benefit-cost analysis, wetland issues, software development and other projects that contribute to the advancement of regional stormwater technology.

Master plans are an important tool to help identify remedial projects for construction, and also to guide new land development projects to be consistent with regional drainage needs.. The master plans also provide valuable input to the District's Five Year Capital Improvement Program, and help to identify and acquire rights-of-way for future capital improvements and areas for preservation. Over 140 major drainageway and outfall system master plans have been completed and eleven are in progress. These represent in excess of \$2.4 billion in drainage infrastructure needs.



Floodplain Management Program

The Floodplain Management Program is funded out of the original 0.1 mill authorization for the District. It was established in 1974 to prevent new flood damage potential from being introduced into the 100-year floodplains. The major activities of the program are: (1) The National Flood Insurance Program (NFIP), (2) Floodplain regulation, (3) Flood hazard area delineation, (4) Development reviews, (5) Maintenance eligibility, (6) Master plan implementation and (7) Public information.

The District works with local governments to assure that they remain in the NFIP, and keep flood insurance available for their citizens. The District also works with the Federal Emergency Management Agency, the agency which administers the NFIP, to assure consistency between District studies and Flood Insurance Rate Maps (FIRM's). Since mid-2001 the District has received annual grants from FEMA to review requests for Letters of Map Change to the FIRMs at the local level. Also, the District has received several grants from FEMA to convert the FIRMs to Digital FIRMs (DFIRM's), and to maintain existing DFIRM's.



The District has the authority to regulate floodplains but has chosen not to do so as long as the local governments implement their own regulations. The District assists the local governments with their floodplain regulations, including the requirements of the NFIP.

The District continues to identify and publish 100-year floodplains through its flood hazard area delineation program. This is usually done in cooperation with a master planning project. The floodplains form the basis for floodplain regulation when development is proposed.

The District reviews and comments on proposed developments in or near floodplains at the request of local governments. This is where efforts are made to have developers and local governments follow or implement the appropriate portions of District master plans. This is also where we attempt to guide development away from the floodplains and to utilize the natural and beneficial functions of the floodplains as assets to their developments and their communities.

Drainage and flood control facilities constructed by, or approved for construction by, local governments must be approved by the District in order for those facilities to be eligible for assistance from the District's Maintenance Program. The determination of maintenance

eligibility rests with the Floodplain Management Program. The District's preference is for preservation over channelization or fill. The less disruption of the floodplain, the easier it is for the project to be eligible. In many cases low flow channel stabilization and a maintenance access trail is all that is required.

Design, Construction and Maintenance Program

In 2006, the Design and Construction, Maintenance, and South Platte River Programs were combined into the Design, Construction and Maintenance Program. This was done to better serve the local governments, which in the past had to work with two or three District project engineers for their design, construction and maintenance needs. Under the reorganization, there is only one contact person for each of the seven counties and for the South Platte River. The funding and budgeting authorizations remain the same.

The design and construction of master-planned projects is carried out through the Five Year Capital Improvement Plan (CIP). Prior to the initiation of the CIP in 1974, the District Board established policies that would distribute CIP funds in such a way that local governments could be confident that one portion of the District would not be subsidizing construction in another portion.

The key CIP policy decisions were as follows: (1) Proposed improvements must be requested by local governments; (2) Proposed improvements must have been master planned; (3) District funds must be matched by local governments; (4) Local governments must agree to own completed facilities and must accept primary responsibility for their maintenance; (5) District tax revenue received from each county will be spent for improvements benefiting that county over a period from 1974 to five years into the future; and (6) The District will not develop a public works department but will rely on the private sector and on existing local governments' public works departments.

The District's approach is intended to minimize the need for a large staff. Generally the District coordinates final designs prepared by consulting engineers. The local governments are involved in all aspects of the design process. The local governments generally acquire the necessary rights-of-way (ROW) and serve as construction contracting agency. The District is, however, sometimes the lead agency for ROW acquisition and construction contracting.



Each year the Board adopts a Five Year Capital Improvement Plan which lists projects and District participation by county from 1974 to five years into the future. This plan forms the basis for District participation in design and construction projects. The CIP has been involved in over \$432 million of construction projects, including \$163.6 million in District funds.

The emphasis of the program is to provide flood management projects that serve multiple purposes, including grass-lined channels with gentle longitudinal slopes and flat side slopes which can be used for parks, open space, trail corridors, wildlife habitat and water quality enhancement. Detention facilities are often completed in conjunction with formal parks. The completed projects should be good neighbors to their community all the time, and not just during times of flooding.

Since 1981 the Maintenance Fund has been used to assist local governments in the Denver area with their drainageway maintenance activities. Through 2008 a total of \$118.6 million of District funds has been spent on major drainageway maintenance. An additional \$5.7 million has been contributed to floodplain acquisition.

Key operating policies for the use of Maintenance Funds include the following: (1) To the extent funds are available, the District will assist local governments with maintenance and preservation of floodplains and floodways; (2) Drainageways on which maintenance projects are constructed must be publicly owned or in a public easement; (3) The expenditure of District maintenance funds is prioritized first toward District-owned facilities and District-funded projects, then to projects funded by others, and finally to unimproved urban and unimproved rural drainageways; (4) Funds derived from the maintenance mill levy are allocated to each of the seven counties within the District on the basis of the tax revenues each county generates for the Maintenance Fund; (5) Local

governments are not required to match District maintenance funds, but may participate in order to accelerate completion of a large project; and (6) The District will not create a public works department. All design and construction work is contracted to the private sector.

An annual maintenance work program is developed for each county based on the funds available for that county and on a prioritized list of maintenance requests from each local government in that county. Maintenance work is divided into three types of activities: routine, restoration and rehabilitation. These activities are described in greater detail below.

Routine maintenance consists of trash and debris cleanup, trash rack cleaning, and control of weeds and other noxious vegetation. Private contractors are hired each year to perform the routine maintenance activities on a unit price basis.

Restoration work is site specific construction work to repair isolated drainageway problems. This work often eliminates the need for more costly work later on. Types of restoration activities include detention pond mucking, tree thinning, local erosion and bank protection repair, isolated structure repair, and local channel grading, stabilization and revegetation.

Rehabilitation projects are major design and construction efforts which are intended to rebuild and reestablish existing drainage facilities which have been damaged or neglected such that structural problems have developed. Examples include reconstructing or replacing drop structures; building low flow or trickle channels; establishing maintenance access into drainageways; and rebuilding or providing protection for existing channel improvements, box culverts, retaining walls, and other facilities.

The South Platte River Program was begun in 1987 and is funded by a separate 0.1 mill levy authorization. It was established in order to provide special attention to the South Platte River, which is the receiving body of water for all the other drainageways in the District. The District Board annually allocates construction project funds based on timing of projects, availability of matching funds, relative need and priority of proposed improvements, and compatibility with the South Platte River master plan. The District will share in the cost of capital improvement projects on the basis of a minimum contribution of 25% from the participating local government. In addition to capital improvement projects, maintenance is a primary activity. The District may contribute up to 100% of the cost of maintenance activities.

Other efforts include cooperative projects with property owners to stabilize river banks, acquisition of right-of-way, detailed inventories of facilities and properties along the river, periodic surveys of the river to track and assess horizontal and vertical movement of the river channel, and cooperation with local governments in floodplain preservation acquisitions and recreation projects.

Information Services and Flood Warning Program

This program was established in 2005 in order to consolidate and enhance the District's information services and flood warning capabilities. The Flood Warning Program (FWP) has served District local governments since 1979 and was previously an activity of the Floodplain Management Program. The FWP assists local governments in developing flood warning plans and installing and maintaining automated flood detection networks. In addition, the District hires a private meteorological service to provide local governments with early predictions of flood potential and to warn them as flood threats become more imminent. Daily forecasts and real-time data are available from the District's website.

Information Services (IS) include a number of vital multi-program support functions such as: developing, operating and maintaining the District's Geographic Information System (GIS). GIS is used extensively for: Digital Flood Insurance Rate Map (DFIRM) production and maintenance; tracking projects for maintenance eligibility; design and construction projects; routine and restorative maintenance projects; flood threat recognition and warning decision support; data sharing; regional mapping initiatives; and other applications.

Another ongoing IS responsibility involves administering the District's website and continually improving Internet access to electronic information available from the District and its affiliates. The District is well positioned to meet these growing demands. Sustainability is achieved through the ever increasing use of this valuable information by our local government partners, consultants, other state and federal government agencies, research organizations, NGO's, local news media, and the public.



In summary

The District's long term sustainability efforts began in 1972. Master planning sets the stage for all our efforts. The Floodplain Management Program works to keep new land development out of floodplains while emphasizing their natural and beneficial functions. The Design, Construction and Maintenance Program fixes existing problems, emphasizing multiple use opportunities; and maintains structural and non-structural solutions. Information Services and Flood Warning provides valuable support to the preceding programs. The results include approximately 5000 fewer structures (or living and business units) in the 100-year floodplain than in 1972, and many miles of open floodplains, trail corridors, wildlife habitat, parks and other beneficial functions of floodplains.

Action: The decision of the Board of Directors to pursue a two-pronged approach of remedial and preventive actions to contain flood losses.

Outcome: The population of the District has tripled since the action described above but there are 5000 fewer structures (units) in the mapped 100-year floodplains than there were in 1970.

	Ecology	Economy	Empowerment	Efficiency	Health
Strengths	<ul style="list-style-type: none"> Preserves floodplains and their natural and beneficial functions Creates habitat Remedial projects improve water quality Policy of open grass-lined channels rather than conduits or hard channels Maintenance presence in drainageways Riparian/wetland preservation and corridor connection 	<ul style="list-style-type: none"> Creating community amenities Creates long-term savings in maintenance Stimulates micro-economy of consultants/contractors doing District work Lower flood damages Less chance of flood disaster response/costs Higher property values 	<ul style="list-style-type: none"> Brings governments together to find solutions to common problems Consistent approach to addressing drainageway issues Provide funding We are specialists Engenders positive relationships with local government at all levels District provides several ways to complete work – we can be in charge or local government Community ownership or vested interest in projects 	<ul style="list-style-type: none"> Identifies and prioritizes capital projects District is very efficient in delivery of our products Frees local governments to focus on other issues of greater importance to them Fewer problems to “fix” and more to maintain 	<ul style="list-style-type: none"> Saves lives. Prevents flood related health problems Improves water quality Multi-jurisdictional coordination Region wide safety Better access to drainageways, environment Connectedness
Weaknesses	<ul style="list-style-type: none"> We have limited enforcement ability Structural improvements can harm habitat and modify natural ecology Maintenance presence in drainageways 	<ul style="list-style-type: none"> Less land for development 100-year protection carries a cost Limited funds compared to needs 	<ul style="list-style-type: none"> Can create conflict Perception that identification of flood hazard harms property value with lower income communities most affected (environmental justice) We don’t own facilities & look to local government to be point of contact We don’t have control of some key elements Maintaining the support of our local elected officials 	<ul style="list-style-type: none"> District does not control local government decisions or other critical aspects of work such as permits Difficult to monitor maintenance needs 	<ul style="list-style-type: none"> Temporary construction disturbance to people’s lives causes stress Structures in natural environment can be seen as negative Can foster false sense of security from larger floods
Opportunities	<ul style="list-style-type: none"> Identifying floodplain properties for future acquisition Restore natural and beneficial functions of floodplains during redevelopment Development review, extending our vision into areas we are not in direct control of Open space, parks, nature preserves and trails 	<ul style="list-style-type: none"> Creates jobs in engineering and construction industries Partnering w/ stormwater utilities, park districts, etc. provides greater funding opportunities Multi-use and recreation opportunities contribute to quality of life/life style that drives long-term business development. 	<ul style="list-style-type: none"> Sharing knowledge with communities Pride of ownership and volunteerism that we have seen in communities like Highlands Ranch and Rock Creek 	<ul style="list-style-type: none"> Ability to match funds with local governments Ability to reallocate and reprioritize funds and work as needed Ability to respond to emergencies Combine knowledge with local governments District can bypass red tape some of the time based on relationships Lower capital investment on the part of developers and replacement costs on the part of local governments 	<ul style="list-style-type: none"> Opportunity to inform people regarding floodplain benefits Multi use projects have many benefits Providing partnering opportunities with local governments Recreation opportunities, outdoor living contribute to a healthy lifestyle Opportunity to inform about flood risk
Threats	<ul style="list-style-type: none"> Local government not enforcing plans, allowing development in floodplain Political/development pressure on floodplain land Bypass review process to save money/time Damage to ecology thru development 	<ul style="list-style-type: none"> Bad economy results in less funding for implementation Seen as another taxing agency/government – don’t see direct value of service District provides Short-sighted quick profit motive Our tax-generated funds may not be available for local government wishes – can’t build parks 	<ul style="list-style-type: none"> Lack of buy-in from some communities Misaligned priorities and hidden agendas from others District is seen, as times, as a threat to their governance Short-sighted need for tax revenues 	<ul style="list-style-type: none"> Regulatory and environmental permitting process can impede efficiency Delays due to local government processes, weather Ownership is a patchwork of public/private entities 	<ul style="list-style-type: none"> Creating habitat also creates health concerns regarding mosquitoes, rabies, other human-wildlife health concern perceptions District facilities can be seen as intrusive and un-necessary, deterrent to health and environment Safety concerns, false sense of security