

Flood Hazard News

Vol. 34, No. 1

December, 2004

The District Celebrates Its 35th Anniversary

By

Bryan W. Kohlenberg, P.E., Senior Project Engineer, South Platte River Program

On June 10, 2004, the Urban Drainage and Flood Control District celebrated 35 years of existence with an event held at Centennial Gardens, a Denver Botanic Gardens facility next to Six Flags-Elitch Gardens, along the banks of the South Platte River in Denver. Over 250 of our friends, partners, contractors, consultants, and elected officials were treated to gourmet food, program, raft ride, and a historic trolley ride along the South Platte River.

Centennial Gardens is five acres of plants in a classical French formal design with a Colorado twist, composed with drought tolerance in mind. These plants are either native and drought-tolerant, or adaptable to drier conditions. With thanks to Denver Botanic Gardens and Denver Parks and Recreation, the Gardens provided the perfect atmosphere for the event,

especially since they are located within the 100-year floodplain of the South Platte River.

The program consisted of opening remarks and introductions by current District Board Chairperson and Arapahoe County Commissioner Debra Vickrey. Joe Shoemaker, former State Senator, then spoke about the creation of the District and its early years; followed by Art Patton, an original and current board member, and professional engineer, who spoke on the evolution of the District from 1969 to present; followed by former Board Chairperson and former Denver City Council President Cathy Reynolds, who spoke on the direction the District has taken the last 35 years. The program concluded with a special presentation from the District staff to retiring Executive Director, Scott Tucker.

brave souls challenged the mighty South Platte River. Additional trolley riders were treated to a short ride up Lakewood Gulch and a brief lesson on the role the trolley played in Denver history.

Back in 1965 the South Platte River roared through Littleton, Englewood, and Denver, including the site now known as Centennial Gardens, causing immense damage to the communities. This killer flood sent a clear message to the communities that a metro-wide organization to address intergovernmental drainage and flood control issues was sorely needed. A group of concerned engineers called the Five County Engineers Group began addressing this need in 1967. Soon thereafter the group became known as the Urban Drainage Advisory Committee of the Denver Regional Council of Governments.

One of the first activities of this group was to develop the *Urban Storm Drainage Criteria Manual*. This manual was the first of its kind and has become a model for other similar documents prepared throughout the United States and the world. Out of legislation sponsored by then State Senator Joe Shoemaker, the Urban Drainage and Flood Control Act was passed on June 7, 1969. Governor Love signed the bill into law June 14, 1969 and thus the District was born.

Today the District covers an area of 1608 square miles and includes Denver, parts of the 6 surrounding counties, and

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Welcoming guests to the anniversary party.

Following the program a raft ride on the South Platte River from Lakewood Gulch to City of Cuernavaca Park was conducted, courtesy of the River Reach Youth Initiative. The historic Platte Valley Trolley (Breezer) provided transportation to the drop off site where twelve

Party (continued from page 1)

all or parts of 33 incorporated cities and towns. A twenty-three member Board of Directors governs the District. The board oversees a \$20 million annual program with only 21 permanent full-time employees and nine part-time student interns. The District receives its

funding from four different property tax mill levies. These funds allow the District to operate five programs: Master Planning, Design and Construction, Maintenance, Floodplain Management, and South Platte River. In summary, the celebration event and the first 35 years of the District were a

rousing success. We look forward to "Working With You" for at least another 35 years.



Former State Senator Joe Shoemaker addresses the crowd.



Festivities included raft trips through the Confluence Park boat chute.

L. Scott Tucker Retires

By Dave Lloyd, Executive Director
On February 26, 2004, Scott Tucker announced his retirement from the Urban Drainage and Flood Control District (UDFCD) effective July 2nd of this year. Scott joined the District in March 1972 as Executive Director, a position he held for 32 years.

Scott obtained his degree in Civil Engineering from the University of Nebraska and a Masters in Civil Engineering from the University of Arizona. Prior to joining UDFCD, Scott was a research assistant at Colorado State University from 1970 to 1972. Prior to that he served as deputy program director and engineer for the American Society of Civil Engineers (ASCE) Urban Water Resources Research Program in Cambridge, Massachusetts.

Scott also served as a lieutenant in the U.S. Army Corps of Engineers. He has twice been awarded the American

Public Works Association's (APWA) National Top Ten Award for outstanding work in the Public Works arena. Scott belongs to numerous professional organizations including ASCE, APWA and has served on the Board of Directors of the National Association of Flood and Stormwater Management Agencies (NAFSMA), a national organization he helped to create in 1978.

Over his 32 years at UDFCD, Scott has organized the efforts in developing a comprehensive program of planning, design, construction, maintenance, flood warning, and floodplain management for the major drainageways in the Denver area. UDFCD's program is unique in the United States and is known and recognized throughout the US and other countries for its innovative work under Scott's leadership.

Scott will be sorely missed at UDFCD but we know he's looking forward to his continuing participation in master bicycle racing on a national level, his

involvement as a volunteer ski patroller at the Loveland Basin Ski Area, and pursuing other interests that have been postponed over the years.

We at UDFCD wish Scott the very best in his new adventures.



Scott Tucker addresses the 35th anniversary gathering

Lloyd's Look

by Dave Lloyd

Timely Comment from the District's Executive Director



What a difference a year makes! Toward the end of February this past year, as I was driving back from vacation in San Diego, I received a voice mail from Paul Hindman to let me know that Scott Tucker had announced his retirement effective July 1. I was shocked to hear this news and I know the rest of staff was as well. We had always assumed that Scott would be here forever as long as his responsibilities to the District didn't interfere with his cycling.

Needless to say, the next several months were a bit tumultuous. The end result was that the District's Board of Directors decided on May 20 that I would be the District's next Executive Director. I was not so much pleased for myself as I was the fact that the Board decided to fill the position from within. I know I had and still have a great deal of support from staff and look forward to moving the District forward in the years to come.

One of the things that has made the transition easy for me is acceptance of the fact that absolutely no one can fill the shoes of Scott Tucker. I've told many people over the last several months that it still feels like I'm sitting in Scott's office. Scott joined the District in March of 1972 when it was just himself and the District secretary.

Since that time he has not only built the District staff to what it is today, but more importantly, he has built the District's reputation over that same timeframe; a reputation that is well known and respected worldwide.

For the last 32 years this column has been called "Tucker Talk." I've had several suggestions on what to rename the column – everything from "Lloyd's Laundry" to "Low Flow Lloyd" to "Dave's Divinings." What choices!

This past year also marked another milestone in the District's history - the celebration of our 35-year anniversary. This culminated in an afternoon of celebration on June 7 along the banks of the South Platte River. We were pleased with the turnout of friends of the District from the local governments we serve to the consultants and contractors that we've come to depend on over the years.

Some changes to occur in District staffing this coming year is the creation of what will be known as the Information Services and Flood Warning Program. Kevin Stewart will be the manager of this program which will allow us to provide better services in the Information Technology, Systems Management, Web Services, GIS and Flood Warning areas.

Not only has there been transition in staff this year, but we've also seen a number of changes in the makeup of our Board of Directors. We're losing a number of our long time Board members at the end of this year and we're seeing new members come join the team through the addition of ex-officio Board representation from the cities of Boulder, Thornton and Westminster (cities that have gone over 100,000 in population) as well as replacements for those members leaving office due to term limits. Our Board currently numbers 23 members and we look forward to these new relationships as we continue to serve our local governments.

I look forward to the challenges of the next several years in the arena of drainage and flood control. Our first priority will always be providing a high level of service to our local governments. Scott, in his parting comments, indicated that he felt truly successful in surrounding himself with good people. Indeed, this is a well-oiled organization that can run on auto-pilot for many years to come.

Ben Urbonas Receives Lifetime Achievement Award

The Urban Water Resources Research Council of the Environment and Water Resources Institute, an institute of the American Society of Civil Engineers, presented a Lifetime Achievement

Award to Ben Urbonas of our staff at their annual meeting in Salt Lake City in July 2004. The inscription on this award reads: *"In recognition and appreciation of your long-standing contribution to the improvement of urban stormwater management in the United States and the world, and for the leadership you provided to the profession and to our Council."* This

award in a way also recognizes the Urban Drainage and Flood Control District as a long-standing leader in the field of stormwater management and its role in developing technology in this field that serves the public and the nation. Congratulations Ben!

Maintenance Program Activities

By Mark R. Hunter, P.E., Manager, Maintenance Program

The Urban Drainage and Flood Control District (District) Maintenance Program committed a total of \$5.8 million in 2004 to maintaining drainageways in the Denver metropolitan area. Most of these drainageways have been improved sometime in the past as part of a subdivision development or a capital improvement project. The bulk of the drainageways we maintain are open channels with grass-lined banks, riprap erosion protection, and rock or concrete drop structures.

Our maintenance work covers the spectrum of drainageway work. It includes debris pick-up and mowing, localized repair to damaged and eroded channels or detention facilities, and consultant-designed rehabilitation to long reaches of deteriorated drainageways.

Mowing and Debris Pick-up

For the year 2004 we awarded eight contracts for mowing and debris pickups under our routine maintenance program. Seven of those contracts were awarded as renewals of the prior year contract. The value of each contract was adjusted to match the movement in the regional Consumer Price Index over the prior year. The other contract was awarded through a competitive bid process.

Adams County	20.9 miles
Arapahoe County	39.3 miles
Boulder County	17.6 miles
Broomfield County	0.2 miles
Denver County	44.7 miles
Douglas County	7.3 miles
Jefferson County	30.3 miles
TOTAL	160.2 miles

The mowing and debris pick-up work was done on 261 different sections of urban drainageways within the District's boundaries. The contractual value of the work was \$702,144. The table above summarizes the miles of drainageways within each county in the District on which we performed regularly scheduled mowing and/or debris pickup maintenance.

Restoration Maintenance

In 2004, \$3,305,600 of work was performed under our restoration contracts. Restoration projects typically address isolated drainage problems where the construction will cost from a few hundred dollars up to \$200,000. Ninety-five individual activities were completed during the year. Several major restoration projects are shown in the accompanying table titled "STATUS OF MAJOR MAINTENANCE PROJECTS." A major advantage of the restoration program is the ability to react quickly to local drainage needs.

Rehabilitation Maintenance

Fifteen rehabilitation projects were at various stages of design or construction during 2004. Those projects are included in the accompanying table titled "STATUS OF MAJOR MAINTENANCE PROJECTS." Rehabilitation projects typically are designed by private consultants and built by private contractors. They are intended to correct severe problems that have occurred on a previously improved urban drainageway. By the end of 2004 the District will have spent about \$1,842,300 on rehabilitative design and construction for the year.

Channel Repairs

In last year's *Flood Hazard News* we described a recent extension of Federal Boulevard in Westminster that crossed **Big Dry Creek** at 122nd Avenue. Erosion was threatening the Federal Boulevard right-of-way at a severe bend in the creek that included a 25-foot tall near-vertical bank. After consulting with the permitting agencies the solution was to relocate a short portion of the creek so the erosive energy of the flow was not directed toward Federal Boulevard. The project was delayed for three months during the spring nesting season while bank swallows made use of the steep bank. The completed project included a backwater wetland at the base of the steep bank. Keeping all the parties informed and coordinated required close management of the work by Mike Sarmiento, Engineering Inspector.

The Montbello area of Denver is tributary to **Montbello Drainage** and to **Irondale Gulch**. Nearly 10 miles of concrete-lined drainage channels collect the storm runoff from Montbello. These channels were constructed over the last 25 years as the subdivisions were built. Their top widths vary from 12 feet up to 35 feet with depths ranging from 4 to 10 feet. For the last seven years we have been setting aside funds to replace the worst block-long sections. Our replacement concrete panels include weep holes and steel reinforcement while most of the original panels did not.

Much of the length of **Grange Hall Creek** has been improved over the last 15 years. One of the upper reaches of the creek is within the City of Northglenn and extends from Grant Street on the east to I-25 on the west. Some improvements had been constructed in the past, but they are now deteriorating or being buried by sediment. This corridor has enough width and enough change of elevation to allow a straight-forward design. However, the drainageway revealed a major surprise when surveying and utility locations were done. Buried in the sediment was a storm sewer outlet that drained stormwater from several blocks of residences. The pipe outlet is well below the proposed grade of the channel so the design team is now reviewing options for how to deal with the storm sewer.

Multi-purpose Projects

In 2004 we again joined forces with other local governments to fund multi-purpose projects. The result of this combined funding is projects that meet a variety of community needs. The City of Morrison wanted to improve the appearance, drainage function, and urban usefulness of **Mount Vernon Creek** at its confluence with **Bear Creek**. All these goals were met through a focused design and concentrated effort by Cindy Thrush, Senior Project Engineer, and Jeff Fisher, Engineering Inspector.

STATUS OF MAJOR MAINTENANCE PROJECTS

A similar multi-purpose project at the confluence of **Cherry Creek** and the **South Platte River** brought together funds from the Maintenance Program, the South Platte River Program, the City and County of Denver, and the Greenway Foundation. The project created an urban park at the edge of the two streams that are considered to be the birthplace of the city.

Boulder County has a very different problem with **Rock Creek** which enjoys a broad open-space corridor on the west side of Highway No. 287. This section of the creek has seen very little direct impact from humans. The exception is that in-stream erosion has damaged the natural habitat of the corridor. The close coordination of multiple interests has been guided by David Bennetts, Senior Project Engineer. We will participate by funding the drop structures to limit the down-cutting of the creek while Boulder County will contribute toward the bank shaping and restoration of the habitat.

Detention Ponds and Sediment Control

In remote areas such as the Canyonlands of Utah or the Grand Canyon of Arizona erosion and sedimentation are normal occurrences. Even if the resultant changes are severe they are a natural and expected component of the environment. Urban settings are far less tolerant of aggradation and sedimentation. A change in elevation of a few feet can have a dramatic impact of the flow characteristics and the associated floodplain of an urban stream. In the past year the maintenance Program carried out significant sediment removals on **Harvard Gulch** from University Boulevard to Colorado Boulevard, on **Grange Hall Creek** from 108th Avenue to Colorado Boulevard, and at the sediment trap on **Willow Creek** south of Dry Creek Road. Additional sediment removals were also done on 10 to 15 other channels and detention ponds within the District. Concrete-lined channels can be even more sensitive to aggradation where even a couple inches of sediment is visible and can support undesirable vegetation.

Project	Jurisdiction		Cost	Status
ADAMS COUNTY				
Big Dry Creek – 122 nd Ave and Federal	Westminster	Design	\$36,560	100%
Repair vertical bank and protect road.		Const.	107,191	100%
Grange Hall Creek – 108 th to Colorado	Thornton	Design	4,280	100%
Remove substantial sediment buildup.		Const.	55,590	50%
Grange Hall Creek – Grant St. to I-25	Northglenn	Design	41,766	70%
Build small drops and repair channel.		Const.	Next year	0%
ARAPAHOE COUNTY				
Big Dry Creek – Progress Pk. to Lehow	Englewood	Design	local gov	100%
Coordinate channel repair & trail work.		Const.	78,549	100%
Greenwood Gulch – U/S Highline Canal	Greenwood Village	Design	In-house	100%
Add sheet pile to drops built in 1999.		Const.	46,000	100%
Little Dry Creek – E. of Colorado Blvd	Centennial	Design	54,963	50%
Build drop structures & repair channel.		Const.	Next year	0%
Westerly Creek – SE of Miss. & Moline	Aurora	Design	In-house	100%
Rebuild drop in concrete channel.		Const.	75,000	100%
Willow Creek – South of Dry Ck. Road	Centennial	Design	In-house	100%
Annual cleaning of sediment trap.		Const.	26,183	100%
BOULDER COUNTY				
Boulder Crk – West of 9 th St, E. Fine Pk	Boulder	Design	In-house	100%
Rebuild river rock drops, rep. erosion.		Const.	100,000	20%
Dry Creek #2 – N.E. of 55 th St. & Arap.	Boulder	Design	43,875	85%
Replace 3 broad drop structures.		Const.	Next year	0%
Rock Creek – Farm west of Hwy. #287	Boulder County	Design	70,516	100%
Channel, bank repair and trails, partic.		Const.	300,000	0%
BROOMFIELD COUNTY				
City Park D'way – Emerald to Midway	Broomfield	Design	44,678	100%
Channel and bank repair.		Const.	315,000	0%
DENVER COUNTY				
Cherry Creek – South Platte confluence	Denver	Design	Included	100%
Bank repair and access, participation.		Const.	75,000	100%
Goldsmith Gulch – North of Hampden	Denver	Design	66,480	100%
Channel and bank repair, participation.		Const.	800,000	100%
Montbello Channels – N.E. I-70&Peoria	Denver	Design	Previous	100%
Ongoing replacement of concrete chan.		Const.	150,000	100%
Sanderson Gulch – At Florida Avenue	Denver	Design	53,066	90%
Repair banks and add & repair drops.		Const.	Next year	0%
West Harvard Gulch – Platte R. to R.R.	Denver	Design	79,913	75%
Drops, channel repair, and trails, partic.		Const.	Next year	0%
West Harvard Gulch – Zuni to Clay St.	Denver	Design	73,579	90%
Corridor study, drops, channel repair.		Const.	500,000	0%
DOUGLAS COUNTY				
Happy Canyon Ck – At Oak Hills Drive	Douglas County	Design	32,830	90%
Add a drop to protect upstream drop.		Const.	100,000	0%
Long's Way Trib – W of Dransfeldt Rd.	Parker	Design	Previous	100%
Repair eroded detention pond.		Const.	73,660	100%
Tallman Gulch – At Siebert Circle	Parker	Design	106,443	100%
Drops, channel repair, and trails, partic.		Const.	375,187	100%
JEFFERSON COUNTY				
Dutch Creek – Sheridan Blvd. to Eaton	Jefferson County	Design	49,941	85%
Drops and repair channel.		Const.	Next year	0%
Lakewood Gulch – Van Gordon-Welch	Lakewood	Design	Included	100%
Drops and repair channel, participation.		Const.	207,271	100%
Lena Gulch – From 20 th to Youngfield	Lakewood	Design	25,000	95%
Drops and repair channel, participation.		Const.	200,000	0%
McIntyre Gulch – West of Holland St.	Lakewood	Design	Stalled	90%
Repair channel banks, participation.		Const.	265,000	0%
Mount Vernon Ck – Confl. w/Bear Ck	Morrison	Design	30,800	100%
Repair narrow urban channel, partic.		Const.	120,000	100%

A detention pond was built in the late 1990s on the **Long's Way Tributary** near it's confluence with Cherry Creek in Parker. At the downstream end of this pond a lowered micro-pool had been installed to trap sediments and provide a maintainable feature that

would improve the quality of the water discharged from the pond. The five foot elevation drop from the trickle channel into the micro-pool was made of graded earth. When the pond would detain water the elevation difference was drowned out by the water and little or

no erosion occurred. However, at lower flow rates erosion was occurring as the water dropped into the micro-pool. Our solution was to restore the micro-pool by creating a sculpted concrete drop structure with a concrete cutoff wall to separate the main detention pond from the micro-pool.

Drop Structures

Drop structures can fail when water flows through, under, or around them due to an inadequate cutoff wall. We repaired several drops in 2004 that suffered from poor cutoff walls. Grouted boulder drops were built on **Greenwood Gulch** north of Orchard Road in Greenwood Village in 1999. The excavated trench for the original grout curtain simply did not extend to the depth called for in the plans. We repaired 4 of these drops a couple years ago and repaired an additional one in

2004. We were able to clean up the upstream side of the boulders and then drive sheet pile and grout it in place to bind the whole structure together.

Westerly Creek is one of several drainageways in Aurora that have been constructed as trapezoidal concrete channels. Vertical concrete drop structures were installed where necessary. Some of the drops did not have satisfactory foundations to support the vertical wall of the structure. The weak foundation allowed differential movement among the concrete panels which, in turn, allowed water to flow under and around the structure and pick up soil particles. The result was that the concrete panels near the drop structure became undermined and eventually collapsed. Last year we rebuilt one of these drops north of Mississippi Avenue. This year we reconstructed the

structure that is southeast of Mississippi Avenue and Moline Street. The redesigned drops have also improved upon the existing underdrain systems which protect the foundations of the drop structures by controlling the ground water.

Over the last 15 years the City of Boulder has used rounded river boulders to build attractive drop structures in **Boulder Creek**. Those drops that were not grouted have experienced movement of some of the boulders. As the boulders tumble out of their configuration the drop structure loses its integrity. We re-used the rounded boulders and locked them in place with a grouted cutoff wall. We also restored any damaged stream banks in the vicinity of the drops.



Left: Willow Creek sediment trap at Dry Creek Road. The pond is full with 800 to 1000 cubic yards of sediment. One of our indicators for when it is time to remove the sediment is when people start having picnics on our "beach." Right: The left side of photo shows the Willow Creek channel. The freshly cleaned sediment trap is on the right. The diversion boards are still in place to keep water out of the sediment trap while it is being cleaned.



Long's Way Tributary sculpted concrete drop structure.



Greenwood Gulch drop structure. The sheet pile cutoff wall is hidden behind the grouted boulder drop structure.

Floodplain Management Program Notes

By Bill DeGroot, P.E., Manager, Floodplain Management Program

Cooperating Technical Partner

The District was the first organization to sign a Cooperating Technical Partner (CTP) agreement with FEMA, and we continue to be one of the most active CTPs. Our recent activities under this program are described below.

DFIRM conversion projects

In late 2003 we began Digital Flood Insurance Rate Map (DFIRM) conversion projects for the City and County of Denver and Northern Douglas County. For the Denver project FEMA provided a \$150,000 grant, and the District and Colorado Water Conservation Board (CWCB) each contributed \$25,000. Our contractor was Merrick and Co. We finished our scope of work in April, and the post processing work is now underway by Michael Baker, Jr., FEMA's National Service Provider.

For Douglas County we divided the project into the area located within the District and the area outside. FEMA contributed \$240,000 and the District and CWCB \$30,000 each for the District portion of the county, which includes Lone Tree and Parker. Our contractor was Icon Engineering. The CWCB is managing the conversion of the rest of the county. The contractor is URS Corporation. We completed our scope of work and turned our work products over to URS in May. URS is handing the post processing.

The Boulder County DFIRM conversion is being managed by the CWCB. The contractor is PBS&J. FEMA is contributing \$200,000, the CWCB \$25,000 and the District \$5000. Completion is scheduled for June, 2005. The City of Boulder, FEMA, CWCB and the District are also working on a hydrology and hydraulic study of South Boulder Creek in Boulder and Boulder County

In September, 2003, FEMA provided funding for updating flood data for seven miles of Plum Creek and East Plum Creek in Douglas County. The

District managed the study, and Icon was the contractor.

FEMA contributed \$75,000 and the District \$25,000. The work products were digital flood hazard data that was provided to URS for inclusion in the Douglas County DFIRM, and the District's standard Flood Hazard Area Delineation report.

Earlier this year we received FEMA DFIRM conversion grants of \$480,000 each for Adams County and Arapahoe County. The District will contribute \$70,000 for each county and the CWCB will contribute \$50,000 each.

The contractor for Adams County is Icon Engineering, and for Arapahoe County it is Merrick and Co. The Adams County project began in September and Arapahoe County began in October. Both are scheduled for completion in September, 2005.

The City and County of Broomfield DFIRM became effective on August 18, 2004. This DFIRM conversion was a joint effort between the District and FEMA (Michael Baker Jr.), and is the first true DFIRM in Colorado.

Realistically, by mid-2006 we should have all of the District's area covered with DFIRMs. That includes a Jefferson County DFIRM completed by Michael Baker, Jr. in 2003. Our next challenge will be to obtain the responsibility for maintaining all aspects of the DFIRMs for the District's seven counties, including base map revisions, Letters of Map Revision (LOMRs) and new floodplain delineations..

LOMC pilot project

On July 1, 2001 we began a pilot project with FEMA to assume the responsibility to review requests for Letters of Map Change for the 32 communities within the District that are participating in the National Flood Insurance Program. We are now three months into the fourth year of the project. Our reports on the results of the first two years are available on our web site.

We have recently added a DFIRM maintenance pilot project to our scope of work. We will be using the Broomfield DFIRM to get a feel for what is involved in map maintenance, including incorporating new LOMRs into the DFIRM, adding new information to the base map, adding a new floodplain to the DFIRM and adjusting to receipt of more accurate data. We will prepare a report at the end of the pilot which will document lessons learned.

Other program activities

The other major activities within the program are flood warning, maintenance eligibility, flood hazard area delineation and master plan implementation by others. Kevin Stewart continues to assure that we have the best possible flood detection and warning system, and he continues to be in demand as an expert in this field. See Kevin's column elsewhere in this issue. Our maintenance eligibility program continues to flourish under David Mallory's direction. See David's column elsewhere in this issue.

Floodplain delineation

We completed four flood hazard area delineation (FHAD) studies this year: Ralston and Leyden Creeks in Arvada; Kinney Creek and Fonder Draw in Douglas County (as part of an outfall systems planning study); a re-study of the South Platte River through Adams County and the previously mentioned Plum Creek and East Plum Creek.

We have FHADs underway for Clear Creek through Adams County, Massey Draw and SJCD (South) in Jefferson County, and Upper Goldsmith Gulch in Arapahoe County. The latter two are part of outfall systems planning efforts for the two watersheds

All of these studies are prepared in digital form compatible with FEMA's DFIRM specifications, and will be incorporated into the appropriate DFIRMs.

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Flood Warning Program Notes

By Kevin G. Stewart, P.E., Manager, Information Services and Flood Warning Program

Introduction

The 2004 flood season brought District residents a welcome change to the drought conditions that have plagued western states over the past few years. Mountain communities in Boulder, Jefferson and Douglas Counties also experienced reprieve from the all-too-familiar high fire danger. The spring runoff was relatively uneventful posing minimal flood threats to the Colorado Front Range. April and May passed with only two days threatening heavy rain and neither of those days produced anything significant in the District. This quiet start to the flood season changed abruptly on June 8 when an intense storm with copious amounts of rain and hail pelted parts of Jefferson County, Lakewood, Golden and Wheat Ridge. By the end of June many Jefferson County residents probably wondered when summer would begin. June 8 was the first of five days in which flash flood warnings were issued for the District. Seven other days warranted flash flood watches, making 2004 one of the most active flood seasons in the 26-year history of the District's flash flood prediction program. Fortunately, no lives were lost and the flooding that did occur was localized with total damages not reaching disaster proportions. The more notable events are described later in this article.

Public Information Projects

Three flood protection handbooks completed in prior years are available online and in hard copy. They contain helpful advice on what individuals can do before, during and after a flood to protect themselves and their property. These booklets were prepared specifically for residents of Arvada, Boulder County and Denver. Jefferson County is taking similar steps to inform its citizens about local flood hazards. This handbook will be available next spring. This past year the District and Jefferson County cooperated in developing three public service announcements designed for use by local cable and TV stations. The PSAs focus on flood dangers in urban areas and along mountain streams, and the increased flood risk caused by wildland

fires. These videos can be viewed from the District's website.

In 2003 the City of Boulder and the District began developing a flood safety information website which is targeted for public use in 2005. Jefferson County is partnering with the District, the Colorado Water Conservation Board and the Colorado Office of Emergency Management to expand the website design to address Jefferson County flood hazards. The multimedia website will feature flood videos, testimonials, descriptions of past floods, aerial photographs and flood inundation maps. A media kit will also be available for release to local newspapers and TV stations to assist them with providing useful public information after a flood.

EMWIN-Denver Coming Soon

EMWIN is a National Weather Service satellite downlink/rebroadcast system that stands for Emergency Managers Weather Information Network. It allows communities to develop their own unique applications including civil emergency messaging. This low-cost system will be ready for testing in early 2005 and was made possible by a coalition of local governments partnering with the District, NWS, Xcel Energy and others. The District provided the initial start-up funds of \$15,000. Local emergency managers, under the leadership of Jim Lancy from Arvada, secured an additional \$34,000 from a DHS grant to acquire 31 EMWIN receivers, antennas and software. Jefferson County administered the DHS funds and provided warehouse space for equipment storage. Xcel Energy approved use of their Cherokee Power Plant for the initial rebroadcast station and also donated \$9,400 to cover the installation costs. David Baca with Xcel deserves much credit and thanks for the progress made to date. The satellite downlink and relay station will be located at the Adams County facilities near I-76 and East 72nd Avenue. Denver plans to assist with acquiring the necessary downlink computers and the NWS will host the public website. Additional partners are being sought to

help with recurring communication costs. Skywarn Systems, Inc. of Fort Worth, Texas is the project consultant. The project information website can be found at www.udfcd.org/emwin.

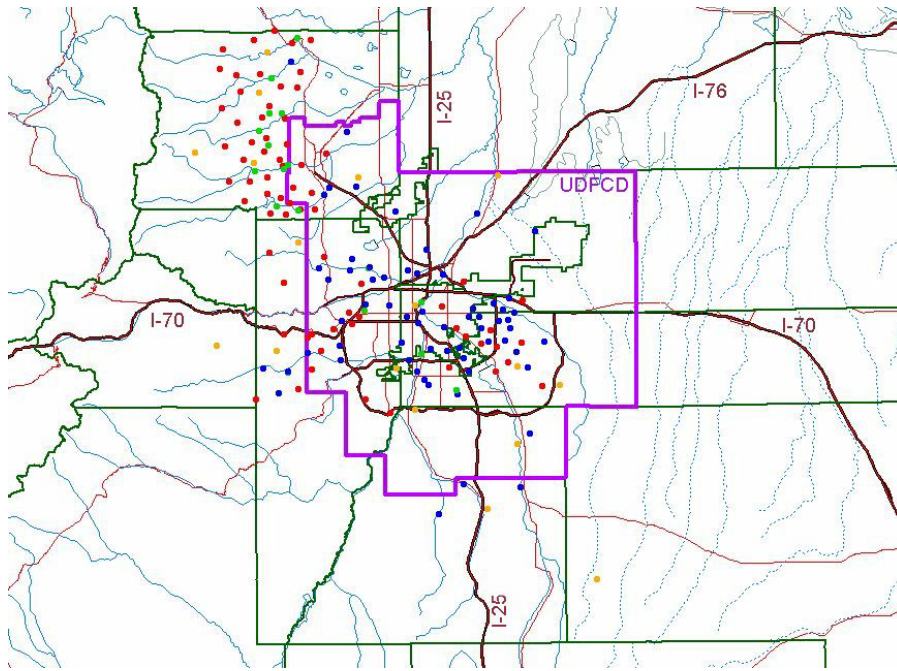
CoCoRaHS Update

The District has been a CoCoRaHS sponsor since 2002. CoCoRaHS stands for "Community Collaborative Rain and Hail Study" and was started by the Colorado Climate Center at Colorado State University following the 1997 Fort Collins flood. Nolan Doesken heads this nationally recognized program that now includes cooperative observers from neighboring states of Kansas and Wyoming. Nebraska operates a similar program known as NeRAIN. Over the past 3 years the network in the District's area of interest has grown to over 800 observers. With all of this great data readily available from the Internet, the District has developed data integration tools that combine ALERT and CoCoRaHS data in a GIS-like browser display. This new procedure can be downloaded from our ALERT website by connecting to the "XML Demo Page." Anyone interested in measuring rain, hail and snow can easily sign-up as a CoCoRaHS volunteer by visiting www.cocorahs.org.

ALERT System News

The District's ALERT flood detection network continues to grow, providing critical early flood detection and decision support for local emergency management and response agencies. The gaging network includes 168 stations that use low-power VHF radios to relay data from 152 tipping bucket rain gages and 82 stream/reservoir water level sensors. Sixteen stations are equipped with weather instruments that measure wind speed/direction, air temperature, relative humidity and barometric pressure. Some mountain weather stations provide data (fuel moisture/temperature) for fire weather purposes. ALERT weather stations have also been used to monitor solar radiation and soil moisture.

Eight new stations were added to the ALERT network in 2004. Rain gages



2004 District ALERT Gage Network

were installed at Aurora Fire Station 12, West Metro Fire Station 13 at Ken Caryl Ranch, and on Shop Creek in Aurora. Boulder County installed two new rain gages (Porphyry Mountain and Fairview Peak) in the Overland Fire burn area near Jamestown. Combination rain/stream gages were installed on Goldsmith Gulch in Denver, on Murphy Creek in Aurora, and at the Flying J detention basin in Aurora. New stream gages will soon be operating on Lakewood Gulch in Denver and Sand Creek in Aurora, and the weather station previously located at the Urban Farm at Stapleton should have a new home by spring. OneRain Incorporated of Longmont provided the 2004 ALERT maintenance services for the 13th consecutive year.

The ALERT website alert.udfcd.org has become the preferred way to access the real-time weather and flood data. Dial-up modems are still available but seldom used, and only a handful of users maintain this capability. This speaks highly for the dependability of Internet communications, but it does create a critical point of failure for some users. The District recognizes this potential and continues to emphasize the importance of redundant communication paths. The District also persists at modernizing the ALERT system by implementing faster and alternate Internet connections, updating display

features, designing improved metadata interfaces, utilizing push technologies (FTP and email), and developing better data integration techniques. One major improvement this year was the addition of a backup web server that became operational in June. Access to this system is restricted to weather forecasters, local governments and emergency response agencies. The usage statistics for 2004 show why the second server was so needed, with the public website receiving 2.29 million hits and 1.05 million individual data requests over the past 12 months. These figures do not include the text products that are disseminated to the NWS every 5 minutes or the alarm messages that are automatically sent by email.

Meteorological Support

The District’s 26-year-old flash flood prediction program (a.k.a. F2P2) provides forecast and notification services directly to District local governments from April 15 through September 15 each year. HDR Engineering Hydro-Meteorological Services of Denver provided the operational forecasts during 2004. Bill Badini was HDR’s project manager and lead meteorologist. John Henz provided the overall training and support for HDR meteorologists. This was the fourth consecutive year for HDR as the District’s meteorological services provider.

2004 District Floods

The 2004 flood season could be judged as below average in terms of the number of threat days (31 vs. 35 average). However, the amount of rainfall that occurred in certain parts of the District like Jefferson County approached record levels and the number of serious threat days was twice the average. Flash flood watches were in effect for three days in June (28,29,30), three days in July (15,16,22) and two days in August (5,18). Flash flood warnings were issued for five days (June 8&27, July 23, August 4&18).

Days with Flood Potential

April		0
May	10,18,	2
June	8-9,15,17,19,26-30	10
July	14-17,19-20,22-23,27-28	10
August	4-5,9-11,18-19,30	8
September	4	1

As mentioned at the beginning of this article, this was an impressive rain year compared to the past few drought years. One indication of this is the number of alarms generated by the ALERT system. The automated alarm notification software developed in 2003 had its first real workout this year with 18 days producing 127 rainfall alarms from 61 stations. Two alarms were caused by rainfall amounts that exceeded 3 inches within a 2-hour time period (Denver West in Lakewood on 6/8 and Denver Zoo on 8/18). One-inch per hour rate alarms occurred 53 times and the other 72 alarms were caused by intense downpours of ½-inch in 10 minutes. This may be a record number of rainfall alarms for the ALERT system, although those statistics are not readily available. With regard to stream gages, new record levels were set for six stations as noted in the 2004 Peak Flows table.

According to HDR’s annual report, 19 of the 31 message days realized their forecast potential. Damaging floods occurred in Jefferson County on June 8 and June 27, in Thornton on July 23, and in Denver on August 18/19. The June 27 storms arguably caused the

most damaging floods of the year—affecting homes in Golden along Arapahoe Gulch and at the Meadow Ranch subdivision in unincorporated Jefferson County along Massey Draw. The following briefly describes these and other notable events:

Tuesday, June 8

An early morning cold front set the stage for 2004's first outbreak of flood producing storms in the District. Messages issued at 4:30PM were forecasting 1.5"/30min rainfall rates. Around 8PM storms began developing along the urban foothills of Jefferson County and at 8:36PM the first ALERT rainfall alarm of the year was triggered by a gage on South Table Mountain. Over the next two hours Golden, Lakewood, Wheat Ridge and nearby areas were pounded by heavy rain and hail. The Colorado Mills shopping mall was hit especially hard with the ALERT gage there measuring over 3 inches in 90 minutes. Homes were flooded and streets were closed in the vicinity of W. 32nd Ave. and I-70 where an unconfirmed precipitation measurement of 5" was reported. A Golden firefighter stated that flood fighting at the intersection of 20th Street and Washington was like working a swift



Hail in the Lena Gulch area

water rescue. Hail depths up to 18 inches were reported in some areas and motorists in Lakewood were rescued from cars. Lena Gulch flooding set new records at all 3 stream gages, which have been operating since 1984. It is interesting to note that this event occurred exactly 17 years to the day (6/8/87) from the previous Lena Gulch record flood. In Boulder County less intense rainfall caused mud and rock slides in the Heil Valley Ranch open space park near Jamestown, a result of burn area runoff from the 2003

Overland Fire. Large hail and street flooding returned to the metro area the following day. Flood and hail damage for the week was estimated at \$100 million.



High water mark on a home in Golden on June 27

Sunday, June 27

Hail was not a problem this afternoon but the rains were. The Jamestown area in Boulder County was hit a second time by mud and rockslides. More serious flooding occurred in Jefferson County in northern Golden and along Massey Draw at the Meadow Ranch subdivision at Deer Creek Golf Course. The News 4 helicopter provided outstanding video coverage of the Massey Draw flood at its peak. Leonard Rice Engineers completed a post-flood survey for the District to document flooding limits, estimate the flood magnitude and provide a better understanding of why damages were so extensive. According to Jefferson County building officials at least 15 homes were damaged in this area. This was surprising given the fact that the developer had gotten FEMA to revise the floodplain map, effectively removing the developed parcels from the floodplain. Consequently, few residents in this area were covered by flood insurance.

The worst flooding in Golden occurred along a small drainage known as Arapahoe Gulch, which runs along the west side of Washington Street. Affected residents there may have a similar predicament with regard to flood insurance since the hazard area associated with Arapahoe Gulch is not shown on the Flood Insurance Rate Map. One home in this area just upstream of Colorado Highway 58 was almost totally submerged by

floodwaters and caught fire during the flood. Fortunately the structure was found unoccupied by Golden firefighters during underwater rescue operations. The storm that caused this flooding produced between 3.5 and 4 inches of rain over the watershed as confirmed by five independent CoCoRaHS observers.

With only a few rain measurements available from the Massey Draw area, plans are underway to reconstruct the storm rainfall for the entire drainage basin using radar precipitation estimating techniques. The largest point measurement of 2.96" was taken in the upper basin west of C-470 by a CoCoRaHS observer. The West Metro Fire Station 13 ALERT gage reported only 2.05" but had a 2-day Saturday/Sunday total of 3.58", which likely aggravated Sunday's flood. The peak discharge through the golf course was estimated at 900 to 1,000 cfs, approximately a 10-year event.

Messages issued at 12:30PM predicted storms capable of producing up to 2 inches of rain in 30-45 minutes. Sugglish movement of these storms caused 3" to 4" over a 90 to 120 minute period. Flash flood warnings were issued by the NWS around 4PM.

Friday, July 23

ALERT rain and stream gages were given a workout this day with 23 rainfall rate alarms occurring between 2PM and 5PM, and 9 stream gages recording

annual peaks. The new Murphy Creek Golf Course rain/stream gage in Aurora measured 2.36” and a flow depth of 3.4 feet. Further downstream, news reports showed roadways being overtopped along Sand Creek and Coal Creek. The Niver Creek detention basin at W. 88th Ave. and I-25 in Thornton filled to a depth of 21.3 feet, which was only 0.3 feet below its 6/3/89 high water record. This flood control structure clearly prevented damages, as did a number of other smaller detention facilities in the northern metro area. The highest rainfall amounts occurred in NE Jefferson, Broomfield and western Adams County affecting Commerce City, Northglenn, Thornton and Westminster. Some rain totals exceeding 3 inches. Early threat notifications were issued by HDR at 11:45AM, well before the 2:06PM rainfall alarm at Niver Detention. The NWS issued a flash flood warning for western Adams County at 3PM.

Wednesday, August 4

Heavy rains this day hit in Douglas and Elbert Counties with the Haskins Gulch and Elbert ALERT gages measuring 1.26” and 1.97” respectively. These rain amounts were not overly impressive, but the stream level on Cherry Creek at Castle Oaks Road rose a remarkable 5.3 feet between 8:30 and 9:30PM, setting a new record. Early notifications concerning the potential were made at 3:40PM and the NWS issued a flash flood warning for Douglas County around 5PM.

Wednesday, August 18

Impressive rainfall fell over much of the District this day, bringing closure to the big storms of 2004. The entire District was covered by a minimum of one inch of rain. The Denver Zoo received 5 inches while a number of other locations system generated 23 rainfall alarms equaling the July 23 count. Maximum water levels for the year were recorded for 21 stations. The Englewood Dam gage set a new 18-year record stage of 23.2 feet. Flooding was reported at many locations with the more notable flows occurring along Cherry Creek, Sand Creek and the South Platte River. An old sheet pile drop structure failed on Sand Creek just downstream of the Quebec Street crossing causing much

concern. Subsequent channel degradation threatening the bridge forced CDOT and Denver officials to pursue a quick remedy. Message 2 (flash flood watch) was issued by HDR valid for the entire District from noon to 6AM Thursday. Heavy rainfall started in western Boulder County before 2PM and moved into Jefferson County around 3PM. At 3:30PM the first flash flood warning was issued for Jefferson County. Later warnings were issued for Aurora, Denver, Arapahoe County and Douglas County. Flooding continued into early Thursday morning.

The five events described above are the days that flash flood warnings were issued for the District. Heavy rainfall and minor flooding occurred on the following 16 additional days: June 9,26,29; July 14-17,19,22,27,28; August 5,6,10,30; and September 4. More information about these and other interesting weather days can be found by visiting the ALERT website alert.udfcd.org. Annual reports by HDR Engineering and OneRain are also available.

2004 Peak Flows

Date/Time	Location	Peak cfs Depth ft.
June 8 20:44	Lena Gulch at U.S. 6	*520 1.2
June 8 21:18	Lena Gulch at Nolte Pond	*860 5.2
June 8 21:43	Ralston Creek at Carr Street	980 3.4
June 8 22:29	Maple Grove Reservoir on Lena Gulch	*190 8.2
June 27 17:53	Van Bibber Creek at Sports Complex	380 3.3
June 27 19:32	Bear Creek at Lowell Blvd.	1,140 5.5 GH
July 23 14:48	Westerly Creek at Montview Blvd.	520 4.9
July 23 15:01	Sable Ditch at 18 th Ave.	210 2.7
July 23 16:09	No Name Creek at Quincy Ave.	*620 7.1
July 23 17:19	East Toll Gate Creek at Buckley	1,200 3.1
July 23 17:25	Granby Ditch at 6 th Ave.	39 6.6
July 23 18:00	Confluence Pond on West Toll Gate Creek	*1,080 3.7

July 23 18:35	Niver Creek Detention at 88 th Ave.	78 21.3
July 23 19:00	Little Dry Creek at 64 th Ave.	TBD 2.1
July 23 20:12	Murphy Creek Golf Course	*N.A. 3.4
Aug 4 21:22	Cherry Creek at Castle Oaks Road	*N.A. 5.3
Aug 18 17:05	Harvard Gulch at Jackson Street	520 3.8
Aug 18 19:53	Goldsmith Gulch at Eastman Ave.	280 2.6
Aug 18 20:03	Goldsmith Gulch at DTC/Temple Pond	440 6.9
Aug 18 20:12	Horseshoe Park Drop on West Toll Gate Creek	1,400 2.6
Aug 18 20:13	Haskins Gulch Confluence on East Plum Creek	TBD 4.6 GH
Aug 18 21:11	Holly Dam on Little Dry Creek	130 18.0
Aug 18 21:15	Utah Park on Westerly Creek	167 7.4
Aug 18 21:23	Havana Park Detention	420 7.8
Aug 18 21:39	Cherry Creek at Champa Street	2,560 6.0
Aug 18 21:57	Powers Park on Slaughterhouse Gulch	TBD 6.5
Aug 18 22:02	Cherry Creek at Steele Street	1,630 3.1
Aug 18 22:02	South Platte River at 19th Street	7,020 8.92 GH
Aug 18 23:35	Sand Creek at Mouth	3,930 7.82 GH
Aug 19 00:15	South Platte River at Union Ave.	1,190 13.46 GH
Aug 19 00:16	South Platte River at Dartmouth Ave.	1,930 3.93 GH
Aug 19 00:19	South Platter River at 3 rd Ave.	1,910 3.37 GH
Aug 19 01:29	Flying J Detention Pond	N.A. 4.3
Aug 19 02:20	Expo Park on Westerly Creek	50 18.2
Aug 19 02:25	South Platte River at Henderson	9,050 9.96 GH
Aug 19 02:32	Englewood Dam on Willow Creek	*170 23.2
Aug 19 02:45	Kelly Road Dam on Westerly Creek	77 9.6

* New Record
GH = Gage Height

Design and Construction Program Notes

By Paul Hindman, P.E., Manager, Design and Construction Program

In 2004, changes have occurred not only at the District level but also in the Design and Construction Program. Dave Lloyd was promoted to Executive Director, which in turn created an opening for the position of Chief of Design and Construction. I was fortunate to be promoted into that position but I only held the title for one week. One of the first items Dave addressed was to change the title of “Chief” to “Manager”. I am very excited to hold the position although I have some very big shoes to fill. To fill my old position as Project Engineer, Laura Kroeger was hired in August (see New Employee Spotlight). Also, Ken MacKenzie continued on as a Project Engineer in the program.

In 2004, the Design and Construction Program committed \$9.0 million to projects throughout the Denver Metropolitan area. As shown in the attached table, the Design and Construction Program continues to manage over 90 projects. Some have been ongoing for many years with multiple phases while others are just getting started.

A couple of projects deserve special recognition. One of those is the Van Bibber Creek Flood Control Project by the Corps of Engineers. As mentioned in last year’s *Flood Hazard News*, the project was bid in the fall of 2003 and construction began in early 2004. Ken MacKenzie, the District’s Project Engineer assigned to the Project, continues to manage the construction project for the District that requires a close relationship with the on-site Corps of Engineers personnel as well as the regional Omaha Nebraska office. Construction is tentatively set for the spring of 2006. The following photograph is during construction of the large box culvert being installed through the parking lot of the Safeway grocery store. It should be noted that during the construction the Safeway remained open for business.

STATUS OF DISTRICT DESIGN PROJECTS

Project Name	Participating Jurisdiction(s)	Status (% complete)
Dahlia/Kenwood Outfall	Adams	25%
Globeville Outfall	Adams	10%
Hoffman Drainageway	Adams	30%
Nissen Reservoir LOMR	Broomfield	10%
McKay Pond	Adams	50%
McKay Pond: Outfall	Adams	95%
North Outfall - Baseline Road	Brighton	20%
Silverado II Detention Pond	Aurora/Denver	5%
Elmer's Two Mile Greenway Project Phase I	Boulder	5%
Erie Reach BP20	Erie	10%
Erie Regional Detention Facility No. 1045	Erie	30%
Louisville Drainageway G	Louisville	75%
Valmont Bridge on South Boulder Creek	Boulder County	95%
13th & Ulster Phase III	Denver	100%
27th Ave. / Federal Blvd. OSP	Denver	65%
30th & Magnolia Phase II	Denver	100%
Cherry Creek: Drop No. 24	Denver	15%
Globeville / Utah Junction OSP	Denver	65%
Goldsmith Gulch Retrofit	Denver	90%
Harvard Gulch/University-Hills OSP	Denver	65%
Lakewood Gulch: 10th Ave. bridge retrofit	Denver	100%
Lakewood Gulch: Tennyson - Sheridan	Denver	5%
Montclair OSP	Denver	65%
Park Hill Phase III	Denver	75%
University / Mexico OSP	Denver	65%
Arvada Channel	Arvada	10%
Bear Creek at Morrison	Morrison	5%
Coyote Gulch	Lakewood / Jeffco	5%
Green Mountain Drainageway B	Lakewood	50%
Hays Lake Outfall	Arvada	95%
Lakewood Gulch u/s Van Gordon LOMR	Lakewood	25%
Lena Gulch: 10th Ave. through Orion St.	Jefferson County	95%
Moon Gulch: Croke Detention Pond	Arvada	5%
Ralston Creek LOMR	Arvada	90%
South Lakewood Gulch: CCU Detention Pond	Lakewood	75%
Big Dry Creek: Allen WTP LOMR	Englewood	90%
Brookridge/Grant Outfall Phase II	Arapahoe County	90%
Cherry Creek: Drops #20 & #21	Arapahoe County	90%
Cherry Creek: Maintenance Access	Arapahoe County	20%
Cottonwood Creek	Arapahoe / Greenwood	100%
Granby Ditch Inlet	Aurora	5%
Holly Hills Detention	Arapahoe County	5%
Little Dry Creek at Arapahoe Road	Centennial	5%
Little's Creek: Broadway to Apache	City of Littleton	95%
Parker/Mexico: Phase 2I	Arapahoe County	95%
Piney Creek: u/s of E-470 (Sampson Gulch)	Aurora	80%
Quebec / Iliff Outfall	Arapahoe County	80%
Quincy Reservoir Drainage	Aurora	95%
Sable Detention	Aurora	5%
Cherry Creek: Apache Plume	Parker	30%
Little Willow Creek	Douglas County	95%
Marcy Gulch: Upstream of Broadway	HRMD	80%
Newlin Gulch @ W. Parker Rd.	Douglas County	20%
O&M Manual - Sedimentation Ponds		

Another project that saw completion of its second phase is the Piney Creek Stabilization project. In 2004, Asia Civil, Inc. completed eight (8) drop structures for Arapahoe County, in conjunction with the District, between Parker Road and Buckley Road. Each drop structure was a vertical sheet pile with a steel cap. Extensive wetland plantings, as well as a wetland mitigation area, were constructed to offset the wetland area that was disturbed during construction. Almost full restoration was achieved within five months of the completion of construction. The District thanks Dennis Buechler with Wetlands and Watersheds, LLC for the expert assistance given during construction to allow for the success achieved. Additional phases of construction of Piney Creek are planned for future years.

As I reflect on my first six (6) months of managing the Design and Construction Program, I realized the key to success is to have good people working with you. I want to thank Ken and Laura who have made my transition smooth and effortless. I am looking forward to many future years with them as we continue to manage the Design and Construction Program together.

STATUS OF DISTRICT CONSTRUCTION PROJECTS

Project Name	Jurisdiction(s)	Cost	Status
Brookridge/Grant Outfall	Arapahoe County	\$913,044	100%
Cherry Crest West Outfall	Arapahoe County	\$375,540	5%
Parker/Jewell	Arapahoe County	\$1,010,000	30%
Piney Creek: Parker to Buckley (Check Structures)	Centennial	\$731,431	100%
Sand Creek: Sand Creek Park-Phase II	Aurora	\$538,000	20%
Valley Club Acres	Arapahoe/Aurora	\$1,531,665	95%
Baldwin Gulch: Phase II	Douglas County	\$276,675	100%
Big Dry Creek: McArthur Ranch Road Phase I	HRMD	\$671,926	100%
Marcy Gulch: Englewood Ditch	Englewood / CWSO	\$269,352	100%
Sulfur Gulch	Parker	\$319,620	100%
Sulfur Gulch: Phase II	Parker	\$686,791	100%
Academy Park Trib	Denver	\$230,000	95%
Lakewood Gulch: Tennyson St. bridge	Denver	\$1,400,000	30%
Virginia Village Phase V	Denver	\$992,000	100%
Kenney's Run	Golden	\$2,000,000	70%
Lakewood Gulch u/s Van Gordon	Lakewood	\$242,000	100%
Lena Gulch: Mountainside	Jefferson County	\$1,391,000	100%
Leyden Dam	Arvada/Westminster	\$1,576,000	100%
Massey Draw: d/s of Wadsworth	Jeffco / Lockheed	\$239,400	25%
South Lakewood Gulch: Reed Street	Lakewood	\$175,000	100%
Van Bibber Creek: Construction	Arvada	\$9,174,000	30%
Big Dry Creek: Maintenance Trail	Littleton	\$407,629	100%
Kalcevic Gulch: Dam	Adams/Highland Hills	\$590,352	40%
Lake Erie Basin Trib 1 to BDC (Wadley Farms)	Adams/Thornton	\$1,019,589	100%
Utah Junction/Julian Street Detention Pond	Adams	\$170,650	60%

Kroeger joins District staff

By Paul A. Hindman, P.E., Manager, Design and Construction Program

Laura Kroeger has joined the District as a Project Engineer in the Design and Construction Program. Laura has a B.S. Degree in Civil Engineering from Valparaiso University and an M.S. Degree in Civil Engineering from the University of Colorado at Denver. Her previous experience has been in the private sector with Sellards & Grigg, Inc. I hope you all join me in welcoming her to the District.



Van Bibber Creek box culvert.



Piney Creek drop structure

South Platte River Program Notes

By Ben Urbonas, P.E., Manager, and Bryan Kohlenberg, P.E., Senior Project Engineer

A Message from the Manager

The South Platte River Program is a unique program within the District that has to address the needs of the largest receiving water (drainageway) within the District. Its creation resulted in the master plan for the South Platte River that was completed in 1985. One of the recommendations of this master plan was that the District create a program and effort that had a focus on the multi-use and unique nature of the river.

In 1985, the District requested the State legislature to authorize a separate tax levy to maintain, reclaim and improve the South Platte River. The State agreed and the program was created in 1985.

In 1986 the District's Board of Directors adopted a resolution outlining the District's policies that spelled out how this program will operate. The Board recognized at that time the regional nature of the river. Namely, it said that this river corridor carries flood waters, provides aquatic and terrestrial habitat, acts as a recreational corridor, is the source of water for agricultural, industrial and municipal uses, and is the recipient of treated wastewater effluent and stormwater runoff from the entire metropolitan area.

Since the program's inception I had the honor to steer it and to help shape many of the river restoration and enhancement activities. It has been a very rewarding experience. During that time the District participated with Denver to rebuild Confluence Park and to build many of the other related enhancements in the Central Platte reaches of the river. We also continue to work with Denver on significant river and environmental improvement projects along the I-25 through Eighth Avenue reach and in the Globeville reaches in north Denver.

We also worked with Adams County and the cities north of Denver to restore many miles of degraded river and eroded and trashed out riverbanks. In the process we installed a number of grade control structures that, for the most part, arrested the degradation of

the river's thalweg and reduced the erosion of the banks. The results included significant improvements in river corridor aesthetics and in enhancements to the wildlife terrestrial and aquatic habitats along those reaches.

South of Denver we assisted the State of Colorado and the South Suburban Parks and Recreation District to maintain the corridor reaches the U.S. Corps of Engineers reconfigured as part of the Chatfield project. One of the more significant improvements was the installation of a utility buttress just downstream of C-470 to prevent the failure of a major water line and a sewer line. This grade control structure arrested the degradation of the riverbed while providing enhanced fish habitat, safe boater passage and fish migration rapids.

Finally, in 2002, in partnership with Adams County, the Cities of Commerce City, Thornton and Brighton, the Denver Water Department, South Adams County Water and Sanitation District and the Metro Wastewater Reclamation District we published the updated master plan for the river in Adams County. I want to thank these partners and also thank the local Corps of Engineers and EPA offices and the Colorado Division of Wildlife for the support, input and the hard work and dedication that it took to complete the updated plan.

The 2002 update expanded the focus along many of the river's reaches in Adams County, on floodplain preservation and acquisition, on continuing improvements to its aquatic and wildlife habitat resources and on the completion of the recreational trail. The goal is to have a continuous trail along the river from Chatfield Reservoir to the Adams-Weld County line that has no at-grade street crossings. In planning for the trail in Adams County, it was routed to avoid the most sensitive wildlife habitat areas. As a result, part of the trail will not be adjacent to the river.

The projects that I described above represent only a part of what we, along with our local government partners and with the cooperation of the U.S. Army Corps of Engineers, accomplished since 1986. I am proud of what the progress that has been made and look forward towards much greater accomplishments in the future.

However, it is time for me now to pass the day-to-day management of this most productive program to Bryan Kohlenberg. Starting in 2005 he will be reporting directly to David Lloyd in the position of a Senior Project Engineer with the District. I will continue to manage the Globeville capital improvement project, since the institutional memory for this very complicated project resides with me.

As I approach my retirement, something that I expect to occur within the next two to five years, I will focus on the Master Planning Program and the needed updates and enhancements to the District's Urban Storm Drainage Criteria Manuals, software, and implementations details. It has been a great honor and joy to lead this program and I thank everyone from the bottom of my heart that has helped us to implement the many improvements that have occurred since 1986 along the River.

Capital Projects

Globeville Phase 3 Project

The final phase of Denver's project to remove approximately 200 acres of highly urbanized lands in north Denver from the 100-year floodplain is well under way, Denver is expecting to initiate the bidding process for this multi-million dollar project early in 2005. The issues surrounding the railroad and the diversion system for FRICO, as described in the last issue, appear to have been resolved and are close to final agreements.

To further assist with this project, the District added another \$950,000 of its funds in 2004 to this project's trust account. We now hope to see the

construction on this project begin in 2005 and be completed in 2007.

Floodplain Acquisition

The District continues to look for opportunities to partner with Adams County and other jurisdictions to acquire lands within the South Platte River floodplain. Now that Adams County has an open space acquisition program, we hope to partner with them more in the future to acquire and preserve riparian and other habitats along the river.

Zuni/Sun Valley Reach Project

Last year the U. S. Army Corps of Engineers was able to pull enough funding together to move the final design of the environmental enhancement project, along the Zuni/Sun Valley reach of the Upper Central Platte River, forward to a 50% complete level. Unfortunately, from this point forward additional funding is in jeopardy due to the failure of Congress to enact the Water Resources Development Act (WRDA), which reaffirms the federal governments pledge to authorize, modify and improve projects, programs and policies protecting the nation from floods and keeping our waterways navigable. Without final congressional action, no new water resources development activity will be authorized to fulfill these important missions and ongoing projects will come to a halt.

Once again, we are hopeful that Congress will appropriate the \$15,000,000 to \$18,000,000 needed for the construction of this project in their 2006 budget. Regardless of the budgetary outcome, the District and Denver are committed to implementing this project and are continuing to acquire the needed lands.

Maintenance Activities

Routine Maintenance

In 2004, South Platte River routine maintenance efforts included:

- 192 river miles (equivalent) of trash and debris pickup and removal
- 3.6 acres of string-trim mowing at access ramps and rest areas
- 78 miles (equivalent) of trail edge mowing

- 9.1 miles of tree pruning along the trail
- 1 removal of misguided traveler (See Photo 1)

Colorado Total Maintenance, Inc. was re-contracted to perform these services in 2004. Over 200 truckloads of trash and debris were removed from the river and taken to landfills by CTM.

This year we have spent considerable time and effort to convert our South Platte River corridor aerial photos to a Geographic Information System (GIS) format. In order to accomplish this, we are utilizing ArcMap by ESRI. This change to a GIS format will allow us to widely distribute the routine maintenance contract documents to our local governments and others in a more efficient manner and at a reduced cost. It also allows us greater flexibility with respect to future modifications and updates to these documents. In the future, we plan to incorporate GIS into our Routine and Restoration Maintenance project management. Ultimately, we hope to have these documents accessible to the public through our web page.

For the seventh consecutive year we participated in the Greenway Foundation's annual NIMBY ("Not In My Back Yard") Fest volunteer trash pickup, during which an additional 50 cubic yards of trash were removed. In addition, government personnel and volunteer groups have picked-up and removed trash from the river corridor throughout the year. Trash is also regularly removed from trash receptacles that are maintained by park personnel along all recreational trails.

Routine Maintenance continues to be the most cost effective program in terms of environmental enhancement and public service. Without it, the trash along and in the river would accumulate tremendously, decreasing the enjoyment of the public as well as creating safety and sanitation issues. The routine maintenance program now completes more than twice the number of trash pickups and trail mowings along the South Platte River than we did 16 years ago. This has enhanced the environment along the river and helped

increase public use of this unique corridor.

Noxious Weed Management

We continue to be aggressive in controlling the many varieties of invasive vegetation that have taken hold along the river. Working closely with Adams County, the City and County of Denver, the City of Sheridan, and the South Suburban Parks and Recreation District, we have removed Tamarisk (a.k.a. salt cedar), Russian Olive and a variety of noxious weeds through cutting, and selective and careful application of herbicides, when needed. This is followed by the plantings of native Plains Cottonwood, Willow and various native dry land grasses.

Elimination of Tamarisk has become a high priority for not only Colorado, but for the entire western United States. Tamarisk is a highly invasive species that is well adapted to the climactic conditions of the western United States. Tamarisk thrives along waterways but is also adapted to drier conditions due to its deep roots. Due to the drought conditions experienced in the west, water consumption has become a major issue. A mature Tamarisk can consume up to 200 gallons of water, per day. Tamarisk tends to develop into thick, monotypic stands. Due to the plants' secretion of salts, and the deposition of salty plant litter, the surrounding soil conditions change to a saline environment over time. This change in soil conditions kills existing native vegetation and severely restricts any future native plant growth. Over time this is the method by which Tamarisk develops a monotypic environment. Tamarisk control and site reclamation is much easier if control measures are started early, before thick growth develops.

During 2004, the South Platte River Program began working with the Northeast Colorado Tamarisk Task Force (NoCoTTF). This task force is a coalition of various government agencies and private businesses. Their goal is to educate the public regarding the negative impacts of Tamarisk. Through these efforts, the task force hopes to eliminate Tamarisk in northeastern Colorado. According to NoCoTTF members, it is apparent that

the Tamarisk control efforts of the District have greatly reduced the impact of Tamarisk along the South Platte River. These efforts began approximately 10 years ago and have been very successful in limiting the spread of Tamarisk along the river.

Tamarisk control will continue to be a necessity along the South Platte River even though it is in much better shape than many other watersheds in Colorado. For more information about the NoCoTTF or Tamarisk control measures, contact Kelly Uhing, Adams County Weed Specialist, at (303) 637-8115 or KUhing@co.adams.co.us.

Restoration Maintenance

In 2004, the following restoration maintenance projects were completed:

- Construction of a new sloping grouted boulder grade control structure at approximately 116th Ave extended, in response to observed river-bottom degradation
- Construction of boulder grade control structure and old bridge pier removal at 16th Street in Denver (See before and after Photos 2 and 3)
- Construction of 1200 feet of bank stabilization/restoration project (cost shared with Denver Water) along east bank adjacent to Denver Water's future water storage facility south of 120th Avenue
- Assisted with construction oversight of bank stabilization at the new Denver substation park located at Confluence Park
- Constructed extension of bank stabilization/trail protection project along the west bank adjacent to Thornton's West Gravel Lakes Fishing Facility at approximately 80th Avenue extended

Finally we have some good news for the wooden pedestrian bridge replacement near First Avenue (extended) in Denver. Design modifications have been made to deal with the adverse environmental conditions found at the site. Reconstruction of an approach ramp was added to comply with ADA requirements. Tierdael Construction Company is now underway with construction and should be completed with the bridge replacement in 2005.

In 2005 we expect the program to include the following restoration maintenance projects:

- Restoration and stabilization of west riverbank at the newly purchased Adams County open space property just north of 104th Avenue
- Several bank stabilization and restoration projects in Adams County
- Several bank stabilization and wildlife habitat rehabilitation projects within South Platte Park in Littleton
- Extension of the river trail northward under 104th Avenue, jointly funded with Adams County

Cooperative Projects with Private Property Owners

Cooperative projects are constructed on flowage and maintenance access easements dedicated to the District by private property owners adjacent to the river in exchange for river restoration work. This year we obtained an additional 19 acres of easement area. To date over 660 acres of such easements have been dedicated, resulting in over 29 bank stabilization and/or river grade controls and riparian revegetation projects since 1988. Several of these easements now contain the river recreation trail, which doubles as river maintenance access.

Two new cooperative projects were completed this year. At 120th Avenue in Adams County, Left Hand Excavating constructed 1,200 feet of soil riprap bank rehabilitation and stabilization along the river's east bank in cooperation with the Asphalt Specialties Company. Next year we hope to extend this project another 600 feet downstream to the future confluence with Henderson Creek. The second bank stabilization cooperative project was constructed by L & M Enterprises, Inc. along the river's west bank, just upstream of 104th Avenue. Here, approximately 1200 feet of soil riprap bank rehabilitation and stabilization was constructed on an easement dedicated by Aggregate Industries, Inc. Construction of a 1000 feet upstream extension of this project is currently underway.

Next year we hope to complete a previously delayed bank rehabilitation and stabilization project along the west

bank of the river at the McIntosh Farm Company property in Adams County. Left unstabilized, this bank will ultimately degrade to the point where it will disrupt dairy farm operations that have been in place for over 100 years. In 2003, the farm company dedicated 31 acres of riparian area in order to get District assistance along their property.

We also hope to initiate construction of restoration improvements to the east bank just downstream of 104th Avenue adjacent to property currently owned, and to be mined, by Aggregate Industries, Inc.



Photo 1: WHOOPS!!!

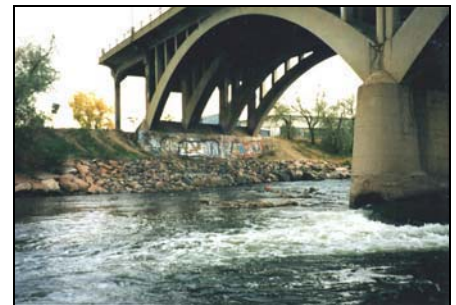


Photo 2: Old 16th Street Viaduct Crossing



Photo 3: New 16th Street Pedestrian Bridge and Grouted Boulder Grade Control. Note the fish migration and boater chute along near bank to keep the riverbed from degrading.

Floodplain (continued from page 7) Implementation efforts

Implementation of portions of our master plans, particularly regional detention facilities, is always a challenge. We are currently negotiating an Intergovernmental Agreement (IGA) with Denver and the Rocky Mountain Arsenal (RMA) for the construction, operation and maintenance of a number of facilities on the RMA. We are also negotiating an IGA with Denver and Aurora regarding the implementation of

regional detention facilities in the Upper Second Creek watershed.

The biggest private sector accomplishment of the year was the construction by Oakwood Homes of the Highline detention pond on Pena Boulevard right-of-way and an open channel from the pond to Tower Road. These facilities are part of the Irondale Gulch Outfall Systems Plan.

Check these out on our web site

We have a photo album showing what we consider to be good examples for others to emulate. We also have an Activity Summary map that identifies all District studies completed or in progress. We update the status of all our studies quarterly. It would be a good idea for anyone working on a drainage study in the District to check this map for existing or on-going studies that might affect their work.

Stormwater Permitting Support Activities

By John T. Doerfer, Project Hydrologist, Master Planning Program

All municipalities in the District that are required to obtain stormwater discharge permits from the state of Colorado have received them. Now the management activities stipulated in permits must be implemented. To help with these efforts, the District continued to assist local governments with these stormwater permit implementation activities in 2004.

Phase I Municipalities

In 1990, the cities of Denver, Aurora, and Lakewood joined forces with the District to form the "Joint Task Force" (JTF). This group continues to work together on permit-related stormwater activities. The three cities are "Phase I" Municipal Separate Storm Sewer Systems (MS4s) under Environmental Protection Agency (EPA) regulations because their populations are greater than 100,000. The three cities submitted their first permit applications in 1992 and were issued permits by the Colorado Water Quality Control Division (WQCD) in 1996. The cities fully implemented all of their original permit requirements by 2001 and were issued permit renewals for a second 5-year term on March 20, 2003.

In addition to other implementation tasks, the JTF developed a brochure on Best Management Practices (BMPs) for industrial sites in 2004. This brochure will be printed and distributed in 2005. In April of 2004, EPA conducted a comprehensive evaluation of Denver's stormwater management program which resulted in some recommendations but no Clean Water Act violations. Stormwater monitoring and assessing the effectiveness of management

programs continue to be an on-going activity of the JTF.

Phase II Municipalities

"Phase II" municipalities are defined in EPA regulations as cities, towns, districts, and unincorporated parts of counties in urban areas with less than 100,000 population and responsibilities for managing stormwater. Most of the cities and counties in the District are Phase II entities. The District hosted a total of five meetings for Phase II municipalities in 2004. In addition to local governments within the District, a number of other MS4s throughout Colorado actively participated in these meetings.

Also, a number of "grassroots" associations have formed among the Phase II municipalities during the past few years. These include separate groups centered around Boulder, Douglas County, Arapahoe County, Jefferson/Adams Counties, Mesa County, and El Paso/Pueblo Counties. During 2004, the District helped with an effort to have public education brochures printed for each of these groups. These were based upon three brochures originally developed by the JTF (see also www.udfcd.org/SWQ_brochures.htm), resulting in significant cost savings for all groups from this approach.

Other topics discussed among the Municipal Workgroup this year included development of a Municipal Operations BMP training video (to be finalized in February 2005); Douglas County's GESC (grading, erosion and sediment control) manual; discharges

from mobile pressure washers; Boulder County WASH (Watershed Assessment of Stream Health) project and 3ME (media, message, and mascot) grant; and a special meeting on proposed permit fee increases by WQCD. Initial topics to be addressed in 2005 include BMP Operation & Maintenance needs and inspection procedures.

Phase II MS4s have 5 years to fully implement their programs. The District will continue to assist the local governments within its boundaries upon request from them. The District's Board of Directors supports these efforts and has expressed how significant cost savings can be achieved through these joint activities and how water quality can be better improved when all jurisdictions cooperate. We plan to organize and sponsor four quarterly meetings of the MS4 groups in 2005.

Stormwater Monitoring

A storm-event monitoring program of the South Platte River and tributaries is managed by the District and is conducted by the U.S. Geological Survey. Water quality data collection in 2004 was more active compared to drought conditions in previous years. Water quality samples were obtained for a total of seven storms in 2004. This program is a Phase I permit requirement.

Results from the District's program to test structural BMPs were reported at the District's conference in April 2004 (see www.udfcd.org). The District will put more emphasis on monitoring and testing of porous pavement sites in 2005.

Master Planning Program Notes

By Ben Urbonas, P.E., Manager, Master Planning Program

Planning Projects

Five planning projects were completed in 2004; 10 projects were under way; and we hope to begin 6 new planning projects in 2005.

We now have a total of over 125 completed watershed-level major drainageway and outfall system plans in our inventory. Some of these studies are updates of master plans completed many years ago.

Urban Storm Drainage Criteria Manual

We no longer print updates to the Urban Storm Drainage Criteria Manual (USDCM), and remind all owners and holders of this manual that all revisions and updates are posted on our web page. Updates for Volumes 1 and 2 are under www.udfcd.org/usdcm/vol1&2.htm for free downloads of the revised pages in Adobe PDF format. Although there were no new updates to the manual in 2004, everyone should keep checking our web page www.udfcd.org for revisions and corrections. In addition, we hope to get away from printed Volumes 1 and 2 of the USDCM in 2005 and make all volumes available to download from our web site in 2005. So, keep checking our web site for this development.

Volume 3 of the USDCM continues to be available for free download from www.udfcd.org/usdcm/vol3.htm. You can choose to download the entire document or download the latest revision of any single chapter.

We have been working to develop a significantly revised section on porous pavement of the Structural BMPs Chapter of Volume 3. Instead of one type of porous pavement, we hope to have at least interim criteria for five types of porous pavement. Before the revised recommendations are incorporated into Volume 3, a draft of these criteria will be posted for public comment. The technical issues supporting porous pavement design and maintenance are quite complex and will determine if these installations will

STATUS OF PLANNING PROJECTS

Project	Sponsor(s)	Consultant	Status
Applewood OSP	Jefferson Co., Golden	Kiowa	Completed in 2004
Cherry Creek MDP u/s of Cherry Cr. Reservoir	Parker, Douglas Co., Arapahoe Co., Centennial	URS	Completed in 2004
Denver High Line Canal Marcy G. to Mississippi Av	Denver Water & WMD, Greenwood Village, SSPRD, Littleton, Cherry Hills Village, Arapahoe Co.	WRC	Completed in 2004
Fairmount Area OSP	Jefferson Co., Golden	Moser Assoc.	Completed in 2004
Second Creek (Lower) MP Update	Adams Co., Brighton & Commerce City	Kiowa	Completed in 2004
Broomfield & Vicinity	Broomfield & Westminster	Kiowa	95% Complete
Lower Brantner Gulch	Adams County, Thornton	Love & Assoc.	90% Complete
Third Creek (Lower) MP Updates	Adams Co., Commerce City, Brighton	Kiowa	90% Complete
Kinney Creek & Fonder Draw	Douglas Co.	WRC	85% Complete
Four Mile Canyon & Wonderland Cr. Updates	Boulder.	Love & Associates	65% Complete
Upper Goldsmith OSP	Arapahoe Co. Greenwood Village, Centennial	Moser Assoc.	60% Complete
Massey Draw & SJCD (S)	Jefferson Co., Arapahoe Co.	n/a	60% Complete
Rock Creek in Superior	Superior	n/a	25% Complete
Yankee Doodle OSP	Arvada	n/a	15% Complete
Lemon and Scott Gulch OSP	Douglas Co.	n/a	Start in Dec 04
Big Dry Cr. (AdCo) North Tributaries Update	Thornton, Adams Co., Broomfield	n/a	Start in 05
Clear Creek Update	Wheat Ridge, Jefferson Co., Adams Co., Golden, Denver	n/a	Start in 05
Cottonwood Cr. W.Q Update	Arapahoe Co., Centennial, CCBWQA, Lone Tree, Douglas Co.	n/a	Start in 05
Dutch Cr./Lilley G. Update	Jefferson Co., Denver, Lakewood	n/a	Start in 05
Murphy Creek Update	Aurora	n/a	Start in 05
Toll Gate Creek Hydrology	Aurora	n/a	Start in 05

succeed and survive over time. As a result, we need many eyes and brains to help us to develop recommendations that will best fit the climate and the conditions found in areas of the country similar to where we are located.

Ken MacKenzie of the Design and Construction Program has authored a major revision of the spreadsheet for the design of stormwater inlets. If you have not yet had a chance to download it, I strongly urge you to do so. Ken also approached the cities and counties within the District to help fund a scale modeling effort for three or more types of inlets. We suspect that some of the design guidance that is in practice today could be improved for some of the inlets used within the District. The District's

Board authorized this effort and appropriated funds that will substantially match the contributions we receive from cities and counties and will permit us to undertake this effort. We hope to have this testing program under way in 2005.

District's Software

Since posting a beta test version of new *UDSWM* software (FSA GUI with SWMM 2000) we launched an initiative to integrate the District's *CUHP* software into a new, Windows-based EPA *SWMM 5.0*.

For the last two years EPA has been working on rewriting the SWMM software and to provide a graphical user interface (GUI). Go to the web page

<http://www.epa.gov/ednrmrl/swmm> to download this software free of charge. I served on its development advisory committee and see it as becoming the national math engine for much of urban stormwater modeling in the future. While this software can be obtained free of charge, we expect private industry to incorporate enhancements and features that will make it even easier to use and will expand its capabilities. Watch for new products that will emerge over the next year that are anchored around this new *SWMM* 5.0 math engine.

Our goal is to have the *CUHP* model be able to work with the new EPA software just like the current version works with the UDSWM program. One challenge is to write software that will convert the existing *CUHP* and *UDSWM* inputs to run under the new software package. Once done, the model will permit us to continue to use our hydrology methods and to expand our modeling capabilities to water quality, continuous simulations and many other features inherent in the EPA's model. We hope to have these tasks completed in 2005.

District's April 2004 Seminar

On April 28, 2004, the District held its annual seminar on urban stormwater and floodplain management topics. It was attended by over 200 participants from municipalities, federal and state governments, consultants and other organizations. The proceedings are available for download from: http://udfcd.org/conferences/conference_s.htm

Douglas and Arapahoe Counties Criteria Manual Update Project

The District continues to work with the preparation of updated stormwater criteria manuals for Douglas and Arapahoe Counties. The consultant for this project is Muller Engineering Company. Since the project began in 2003, the Cities of Centennial, Lone Tree and Castle Rock have joined this effort. It is expected that the manuals for all the counties and cities now participating in this effort will be released in 2005.

Denver is preparing a BMP Implementation Manual

Denver's Wastewater Management Division is continuing with its effort to

develop a BMP implementation guidance document. The consultant for this project is Wright Water Engineers, Inc. This effort will result in a document that will suggest options of how to make BMPs work in an ultra-urban infill and redevelopment areas. Look for this document to also be released in 2005.

Denver is updating its Stormwater Design and Technical Criteria

Denver's Wastewater Management Division has launched an effort to update its Stormwater Design and Technical Criteria. The District has been asked to manage this project and is working with Denver and Wright Water Engineers, Inc., the project's consultant, to come up with an updated criteria document. Much of the focus is on streamlining the old document, utilizing the technical criteria of the District through cross-references and integrating the BMP implementation issues and guidance developed under the effort described above. Look for this effort to be completed late in 2005.

New Spillway Gates at Maple Grove Reservoir

By Mark R. Hunter, P.E., Manager, Maintenance Program

By mid-December, 2004 the two new steel crest gates located in the spillway of Maple Grove Dam were ready to hold back the water that was re-filling the reservoir. The new gates replaced two inflatable dams (fabridams) that were installed in 1977 and were near the end of their service life. The fabridams were installed to improve the operational control of the reservoir and to reduce spillway outflow to be in line with the flood-carrying capacity of the downstream channel.

Maple Grove Reservoir is situated on Lena Gulch at 27th Avenue near Youngfield Street in Lakewood, Colorado. Consolidated Mutual Water Company owns the reservoir and uses it to store raw water. The water is eventually treated and distributed to Consolidated's customers.

When Maple Grove Reservoir was constructed in 1955 it inadvertently provided substantial downstream flood protection. This benefit to the communities downstream of the reservoir was recognized in the 1975 Lena Gulch Drainage Study.

In 1974, Consolidated was directed by the Colorado State Engineer's office to enlarge the Maple Grove Dam spillway to pass the calculated Standard Project Flood. This is the flood that would result from a storm

with a recurrence interval of 250 years in the Lena Gulch drainage basin upstream of the reservoir.

Portions of Wheat Ridge, Jefferson County, and Lakewood benefited from



Looking upstream at the old fabridams

the flood protection provided by the reservoir. Along with the District, these communities cooperated with Consolidated in 1976 to design a unique spillway enlargement that met the needs of both Consolidated and the flood-prone communities downstream of the reservoir.

The coordinated plan called for Consolidated to own the 30-foot long by 6-foot tall dam and the District to own the 40-foot long by 10-foot tall dam, both of which were located in the newly-enlarged spillway. The dams in the spillway allowed discharges through the spillway to be controlled by the mechanically operated gates. The result was that the District and downstream local governments could anticipate acceptable spillway outflows during 100-year storm events while Consolidated could be confident in being able to withstand the Standard Project Flood without overtopping the reservoir.

The fabridams were inflated by a combination of air and water and were difficult to operate and maintain. They showed their vulnerability in March of 1979 when vandals using knives sliced

open the 30-foot long dam allowing a relatively small but certainly unexpected flood to occur. The peak flow immediately below the reservoir was about 750 cubic feet per second and caused some residential basement flooding and first floor damage to some commercial buildings.

The replacement system uses hydraulic cylinders to raise and lower the two

independent crest gates. They will operate under the same discharge parameters as did the fabridams. The new steel crest gates are more resistant to vandalism and are far simpler to operate and maintain than the fabridams. The new system affords renewed confidence in the integrity of Maple Grove Dam to the District, Consolidated, and the communities downstream of the reservoir.



Looking upstream at one of the new gates

Maintenance Eligibility Program

By David Mallory, P.E., Senior Project Engineer, Floodplain Management Program

Construction Plan Reviews

The Wednesday, November 24th headline in the *Rocky Mountain News* proclaimed "Home Boom, \$13.1 billion in 2004 home sales". This year's continued robust housing market was fueled by low interest rates, a belief the Colorado economy is strengthening and a post election bounce. Total home sales for 2004 will likely outpace last year's record by 10%. The result was a continued boom in land development activities. The eastern E-470 and northern I-25 corridors have attracted the largest development interest. District staff reviewed over 300 construction plan referrals. Providing timely reviews is always challenging and this year was no exception. Terri Fead, PE has supplemented District staff

throughout the year. Terri's involvement has been a tremendous benefit to the maintenance eligibility program and I'm happy to announce she will be part of the program next year.

The District's maintenance eligibility database, updated bi-monthly, and the *Guidelines for Maintenance Eligibility Of Flood Control Facilities Constructed By Others* (Maintenance Eligibility Guidelines) have been available online throughout the year. This has proved helpful to local governments and consulting engineers alike. Another effective tool has been the practice of holding project meetings involving District staff, design consultants and local government representatives as a way to reach consensus and move

construction plans quickly through the final review process. We are also available by e-mail, fax or telephone to answer questions on design criteria and the maintenance eligibility program.

In April, the District hosted a workshop addressing current issues and guidelines in stormwater planning and design (see Ben Urbonas's article). One presentation subject was "Maintenance Eligibility and Master Plan Implementation". Bill DeGroot touched on this issue in his article. Bill continues to provide excellent leadership in this important effort. Private land development projects are responsible for constructing perhaps one-half to two-thirds of the Denver metropolitan area's major drainageway

infrastructure. In working with local governments, developers and their consultants, we have also been mindful that major drainageways must be attractive, provide a community asset and represent a "sense of place" in addition to functioning hydraulically. The aesthetic and urban design components are difficult to capture in criteria manuals, but oh so important in the final product.

RTD's West Corridor Project

Voters approved the \$4.6 billion Fast Tracks project in November. One of the six alignments, known as the West Corridor, will precede the other alignments into design and construction phase. The West Corridor, which will connect downtown Denver to the Federal Center and Jefferson County Government Center, follows the old Associated Railroad alignment, which RTD purchased a number of years ago. The West Corridor project is budgeted at \$500 million with major impacts to

the South Platte River, Lakewood Gulch, Dry Gulch and North Dry Gulch. We have been working with City and County of Denver, City of Lakewood and RTD representatives since mid-summer in an effort to advance the preliminary design, enhance drainageway and open space functions and define budget risks for RTD. Significant progress has been made and significant work still needs to be done. The largest remaining issue is the South Platte River crossing. The crossing alignment is approximately 14th Avenue, just north of the Zuni Power Plant and south of Denver's Solid Waste Management facility. Stay tuned...

In the field

An integral part of the maintenance eligibility process is construction oversight. Construction activity has increased this year over past years. At any given time, we typically have 120 to 150 active construction projects spread out over 1600 square miles in many

different local jurisdictions. We depend heavily on networking and partnerships developed with local governments and various engineering consultants over the years to adequately cover construction oversight. In some cases, local government inspection staffs have conducted construction observations on the District's behalf. Field reports and/or digital photos are typically provided to us through e-mail. We also rely upon local inspection staff, engineering consultants and in some instances, contractors to keep us apprised of construction progress and the need for District construction site visits. During 2004, District staff completed over 100 construction site visits. Over 60 projects were completed and recommended for construction acceptance during the preceding 12 months. Another 30 previously approved projects were re-inspected for adequate vegetative cover and received final approval.

District Projects in the News

Two projects tie for CASFM 2004 Grand Award

Two projects with District involvement tied for the 2004 Grand Award for Engineering Excellence presented by the Colorado Association of Stormwater and Floodplain Managers at their annual conference in August.

The Goose Creek project was a flood mitigation project sponsored by the City of Boulder and the District, and designed by ASCG, Inc. The \$8 million



Goose Creek channel, decorative walls and trail

project 3200 feet of walls, a continuous trail along the 3300 foot length of channel, and creation of wetlands and wildlife habitat.

The Comprehensive Stormwater Management at Stapleton project involved the District in ways other than funding. This project included the restoration of Westerly Creek on the former airport site. In order to meet tight time lines the District met with Denver, developer and designer representatives on a monthly basis to

assure that the completed design would be eligible for District maintenance assistance, and would also experience minimal difficulty in receiving a Conditional Letter of Map Revision from FEMA. Both objectives were accomplished.

The developer is Forest City Stapleton, Inc. and the designers were Matrix Design Group, Inc. and EDAA, Inc.

Marcy Gulch featured in magazine

The Marcy Gulch restoration project which has won several awards and is described in detail in the 2003 edition of *Flood Hazard News* was the cover story in the September/October issue of *Land and Water*. The project was sponsored by the District and the Highlands Ranch Metro Districts.

District wins accounting award

For the fifteenth year in a row the District has received a "Certificate of Achievement for Excellence in Financial Reporting" from the Government Finance Officers Association of the United States and Canada.

The certificate is presented to government units whose comprehensive annual financial reports achieve the highest standards in government accounting and financial reporting. Congratulations to Frank Dobbins, Manager of Finance and Accounting, for continuing this string of awards.

2004 Professional Activities of District Staff

Dave Lloyd, Executive Director

- *Attended NAFSMA 2004 Annual Meeting, Monterey, CA, September 20-23, 2004
- *Speaker at Cherry Creek Stewardship Partners Annual Conference, November 5, 2004
- *Member, Independent Review Panel, City of Boulder.

Bill DeGroot, Manager, Floodplain Management Program

- *Member of the Board of Directors and Chair of the Floodplain Management Committee of the National Association of Flood and Stormwater Management Agencies (NAFSMA).
- *Made a presentation on Lessons Learned and Innovative Uses of Mapping Data during a Flood Map Modernization Workshop at NAFSMA's annual meeting in Monterey, CA in September.
- *Member of NAFSMA's working group on Multi-Hazard Map Modernization CTP Training.
- *Co-authored with Brian Hyde, Colorado Water Conservation Board, a paper on "Lessons Learned from DFIRM Conversion Early Implementation Projects" which Brian presented at the Association of State Floodplain Managers (ASFPM) annual conference in Biloxi MS in May.
- *Authored "Improving Implementation of the 1% Flood Standard" on behalf of NAFSMA for the ASFPM Foundation: Gilbert F. White National Flood Policy Forum in Washington, DC in September.
- *Presented an update on the District's Cooperating Technical Partners experiences at the FEMA Region 8 CAP-SSSE conference in Denver in April.
- *Presented "Design of Drainageway Structures for New Development" at the District's annual conference in Northglenn in April.
- *Presented the District's experiences as a Cooperating Technical partner at the Interstate Council on Water Policy Annual Meeting in Philadelphia in December.
- *Member of the Colorado Water Conservation Board 2004 Floodplain Rules & Regulations Revision Project Advisory Committee.
- *Member of FEMA's Flood Hazard Data Standards Working Group, tasked with developing consistent data collection and analysis methods for communities with similar risk.
- *Member of Association of State Floodplain Managers, American Society of Civil Engineers, and Colorado Association of Stormwater and Floodplain Managers.

Kevin Stewart, Manager, Information Systems and Flood Warning Program

- *National Hydrologic Warning Council (NHWC) Chairman.
- *Member of U.S. Department of the Interior Advisory Committee on Water Information, Subcommittee on Hydrology
- *Speaker at American Meteorological Society (AMS) Second Users Conference in Seattle in January.
- *Participant at National Weather Service Partners Workshop in Seattle, WA in January.
- *Speaker & moderator at 19th ALERT Users Group Conference in Yosemite, CA in April.
- *Speaker at ASFPM Annual Conference in Biloxi, MS in May
- *Attended 29th Annual Workshop on Hazards Research and Applications in Boulder in July.
- *Invited participant at AMS 1st National Weather and Climate Enterprise Partnership Summit in Irving, TX in July.
- *Invited participant at ASFPM Foundation: Gilbert F. White National Flood Policy Forum in Washington, DC in September.
- *Speaker & moderator at 14th Southwestern Association of ALERT Systems (SAAS) Conference in Mesa, AZ in October.
- *Invited participant at New Jersey Hydromet Group Meeting at Rutgers University in New Brunswick, NJ in October.
- *Guest speaker at Denver-Boulder AMS Chapter meeting in Boulder in November.

Ben Urbonas, Manager, Master Planning & South Platte River Programs

- *Gave a talk at the April 28th District's one-day seminar focused on volume reduction BMPs and some findings that have resulted from District's BMP testing program.
- *Co-authored a paper with John Doerfer on *Master Planning for the Stream Protection in Urban Watersheds*. John presented it at the Novatech 2004 conference in Lyon, France in June. An expanded version of this paper was selected for publication in the Water Science Technology journal that is published in Europe.
- *Continues to serve on the Board of Directors of the *Cherry Creek Basin Water Quality Authority*.
- *Continues to serve as a vice-chairman of the Water Environment Research Foundation's *Stormwater Technical Advisory Committee*. Also serves on four of its research project development committees; chairs two of them.
- *Received the *2004 Lifetime Achievement Award* in June from the Urban Water Resources Council of the Environment and Water Resources Institute of the ASCE. This was the first such award ever given by the UWRRC.
- *Co-authored three papers on the *EPA-ASCE International BMP Database* for presentation at the annual EWRI Congress in Salt Lake City in June. Presented one of them.
- *Authored a presentation of the *EPA-ASCE International BMP Database* for presentation at the StormCon conference in July. Due to time conflict, presentation was made by Eric Strecker on Ben's behalf.
- *Was one of three invited speakers at the California Stormwater Quality Association's 10th Quarterly Meeting in Ontario, California in September. Ben's talk was on *BMP Effectiveness Assessment and Their Selection Issues for Long-Term Performance*. He also participated in an extended panel discussion.
- *Presented a talk was on *UDFCD BMP Program 2004 Assessment Update and Criteria Development* at the National Association of Flood & Stormwater Management Agencies annual meeting in Monterey, California in September.

*Was one of two invited speakers at the Nevada Water Environment Association conference in Reno in December. Ben's talk was on issues and items to consider in selecting BMPs and developing local criteria for them. He also participated in an extended panel discussion.

Paul Hindman, Manager, Design and Construction Program

*Co-Chair of Cherry Creek Stewardship Partners Annual Conference

*Chair of the Site Selection Committee for the American Public Works Association (APWA) International Public Works Congress and Exposition.

*Committee Member of National APWA Awards and Review Committee

*Chair of Scholarship Committee for the Colorado Chapter of APWA.

*Co Authored "Sense of Place" workshop with Michelle Leach, Domani LLC, presented at Colorado Association of State Floodplain Managers annual conference in Glenwood Springs, Colorado

Cindy Thrush, Senior Project Engineer, Maintenance Program

* Co-presented with South Suburban Park and Recreation District, Urban Edges, and ASCG Inc, on "Public/Private Partnership for Successful Greenway Development in Colorado" at the 17th National Trails Symposium in Austin, Texas.

Bryan Kohlenberg, Senior Project Engineer, South Platte River Program

*Continued as NSPE's scoring coordinator for the Jefferson Chapter and Colorado State MATHCOUNTS competitions for 7th and 8th graders.

John Doerfer, Project Hydrologist, Master Planning Program

*Chairman, Municipal Workgroup, Colorado Stormwater Task Force.

*Member, Impacted Water Supplies Advisory Committee, Colorado Water Quality Forum.

*Member, Urban Water Resources Research Council, Environment and Water Resources Institute (EWRI), ASCE.

*Secretary, Standards Committee - Management Practice for Control of Erosion and Sediment, EWRI/ASCE.

*Co-Author with Ben Urbonas, "Master Planning for Stream Protection in Urban and Urbanizing Watersheds," *NOVATECH 2004, Sustainable Techniques and Strategies in Urban Water Management, 5th International Conference, June 7-10, 2004, Lyon, FR.*

Mark Hunter, Manager, Maintenance Program

*Co-Chairman, International Erosion Control Association (IECA) Stream Restoration Technology Section.

*Member of IECA Technical Review Committee.

*Member of IECA Awards Committee.

*Committee member for the Mountain States Chapter of IECA.

*Editor of newsletter for the Mountain States Chapter of IECA.

David Mallory, Senior Project Engineer, Floodplain Management Program

*Presented "Maintenance Eligibility and Master Plan Implementation" at the District's April workshop and the CASFM conference in September.

*Elected CASFM's treasurer.

*Member of CASFM and ASFPM.

David Bennetts, Senior Project Engineer, Maintenance Program

*Program Chair for the 15th Annual CASFM Conference in Breckenridge in September

*Council Member, CU Denver Engineering Council

Ken McKenzie, Project Engineer, Design and Construction Program

*Presented "Stabilizing a Severely Incised Residential Channel On a Limited Budget" at the CASFM Conference in Glenwood Springs in September.

*Taught engineering courses with Dr. James Guo as part of the Urban Stormwater Hydrologist Certificate Program at the University of Colorado at Denver.

*Served on ASCE's Urban Water Resources Research Council.

*Served on the Metropolitan State College of Denver Engineering Technology Advisory Board.

*Member of ASCE and CASFM

Jeff Fisher, Engineering Inspector, Maintenance Program

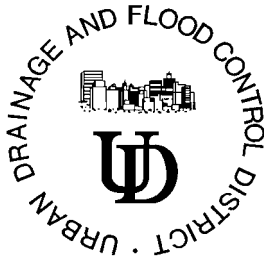
*Co-Chairman for the annual Inspector's Conference for the Colorado Chapter of the American Public Works Association (APWA) in Denver, Colorado.

Mike Sarmento, Engineering Inspector, Maintenance Program

*Received certification from ACI for Concrete Testing Technician

*Received Associate Degree in Spanish from Red Rocks Community College

*Member, APWA and AWWA



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Color versions of all of the photographs in this issue, and additional photos and figures, can be seen on our web site at:

www.udfcd.org

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FLOOD HAZARD NEWS

Bill DeGroot, Editor

Drop Height for Channel Erosion Control

By James C.Y. Guo, Professor and Director

Department of Civil Engineering, University of Colorado at Denver

Read this excellent technical paper on by going to www.udfcd.org and clicking on Read our latest edition of [Flood Hazard News](#).

The District's Bid Tabulation Program: A Useful Tool

By Eliot Wong, Student Intern, Design and Construction Program

As of this month, bid tabulations from 34 District projects can be quickly and easily accessed through the District's Bid tabulation program. These projects are the most current, spanning over a five-year period. Learn how to use this program by going to www.udfcd.org and clicking on Read our latest edition of [Flood Hazard News](#) and then clicking [District's bid tabulation program](#).

District to conduct physical model testing of storm sewer inlets

By Ken MacKenzie, Project Engineer, Design & Construction Program

The District is proposing to conduct a physical model study of storm sewer inlets in 2005. Learn more at www.udfcd.org. Click on Read our latest edition of [Flood Hazard News](#) and then click [District to conduct physical model testing of storm sewer inlets](#).