Maintenance Program Activities

by
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Routine Maintenance
In 2003 $730,300 was spent for mowing and debris pickups under the routine maintenance program. This work was done on approximately 254 different sections of urban drainageways within the Urban Drainage and Flood Control District (District) boundaries. The table below summarizes the miles of drainageways within each county in the District on which we performed regularly scheduled mowing and/or debris pickup maintenance.

Adams County	19.8 miles
Arapahoe County	37.5 miles
Boulder County	16.8 miles
Broomfield County	0.2 miles
Denver County	44.7 miles
Douglas County	6.1 miles
Jefferson County	29.1 miles
TOTAL	154.2 miles

The routine program is primarily debris pickups and native grass mowing. This is fairly straight-forward work, yet we are open to adjusting the frequency, schedules, and limits of work of the pickups and mowings to suit the changing needs of the community and character of the drainageway. In last year's *Flood Hazard News* article we stated that it is common for urban drainageway corridors to be prized as neighborhood amenities. Along with that outlook comes the community desire for a level of drainageway maintenance that goes beyond our original flood control debris pickups and mowings.

In contrast to these highly urbanized drainageways there are sections of creeks that can accommodate a less manicured look. These drainageways often have a wider corridor, fewer structures, a lower level of use, and more variability in the grading. On some of these drainageways during 2003 we reduced the number of mowings and allowed the grasses to grow taller between mowings. The advantages of fewer mowings are improved habitat, a more natural look, better opportunity for wetland plants to thrive, and more shade for the soil. We recognize that the relatively dry summer contributed to our being able to reduce the mowings. In 2004 we will continue to monitor the comments of the neighbors and the appearance of the drainageways particularly for the presence of weeds.

Restoration Maintenance
In 2003 the restoration program completed $1,718,500 of work. Restoration projects typically address isolated drainage problems where the construction will cost from a couple hundred dollars up to $150,000. Eighty-seven individual activities were completed during the year. A major advantage of the restoration program is the ability to use it to react quickly to local drainage needs.

Much of the work we do in the maintenance program can be summarized by a few observations. The narrower the stream corridor, the less natural the drainageway, the more constrained the drainage system, and consequently, the more structural the channel. In this summary one can see some of the elements of Lane's equilibrium concept for a stable stream channel which balances flow rate and channel slope against sediment load and size of bed material.

In last year's article we described a two-year-old drop structure on **Little Dry Creek** in Cherry Hills Village that had been repaired with an injected product. The material was injected in a grid pattern under the grouted boulder cutoff wall to seal off the water that was passing under the structure. The solution has been in place for a year and a half with no evidence of failure or renewed water bypass. We will continue to monitor the status of this practical alternative to drop structure repair.

About six miles further upstream on **Little Dry Creek** west of Uinta Street in Arapahoe County a very different problem had occurred. A previous maintenance project had seen renewed erosion. The original construction had left a portion of the creek flowing over a bedrock outcrop which appeared to be serving as a drop structure. However, once exposed to air and erosive power from the creek the poorly consolidated shale and siltstone bedrock quickly failed. This very narrow corridor allowed no room for erosion or stream meandering. Additional grouted boulder drop structures were built and the work was extended both upstream and downstream to connect to stabilized facilities.

A recent extension of Federal Boulevard in Westminster crossed **Big Dry Creek** at 122nd Avenue. The creek has continued to meander and it now threatens the Federal Boulevard right-of-way. A severe bend in the creek includes a 25-foot tall near-vertical bank that is eroding toward the roadway. The current plan being discussed with the permitting agencies is to relocate a short portion of the creek so the erosive energy of the creek will not be directed toward Federal Boulevard.

In our semi-arid climate trees are a desired landscape feature, but when a drainageway corridor becomes thick with water-loving trees the flood-carrying capacity of the channel is reduced. We removed overgrown trees from the channel of **Cherry Creek** through Denver in 1983-84; ($93,000), 1988; ($82,000), and 1995; ($76,000). Coordinated with the City and County of Denver, we will spend about $120,000 in 2003 removing trees from the Cherry Creek channel.

As more detention ponds and water quality ponds are built the maintenance of them becomes more visible. A detention pond on the **Long's Way Tributary** to Cherry Creek in Parker was built in the mid-1990s. The original metered outlet had a perforated riser pipe buried in a gravel mound.

This outlet was too easily plugged with the result that the pond never completely drained and was impossible to maintain because of the resulting bottom of muck. We rebuilt the outlet with a concrete apron and a slotted weir with metering plates to match the effective openings of the original design. The pond now drains between runoff events and is far easier to maintain.

The **Montbello** area of Denver is served by nearly 10 miles of concrete lined drainage channels. They were constructed 25 years ago as the subdivisions were built. Their top widths vary from 12 feet up to 35 feet with depths ranging from 4 to 10 feet. We rebuilt about 1400 linear feet (2 separate locations) of channel with our most recent push to replace the very worst sections of these concrete drainageways. Our replacement concrete panels include weep holes and steel reinforcement while most of the original panels did not.

We are participating with the Denver Parks Department in preparing several reports that document the current conditions and future needs for both drainageway and recreational uses. Studies for **Harvard Gulch, West Harvard Gulch, and Sanderson Gulch** have been completed. These reports inventory the condition of existing facilities and structures, develop preliminary cost estimates for repairs or replacement, and prioritize the severity of drainageway problems. Final design is underway for a section of West Harvard Gulch where funds from multiple parties will be combined to solve several problems.

Englewood Dam creates a regional detention pond on **Willow Creek** in Arapahoe County. As runoff enters the wide flat area at the upper end of the flood pool the sediment load is dropped. After years of this imperceptible aggradation the sediments had flattened the slope of the channel so much that water was backing up causing long-standing pools and often depositing sediment on the pedestrian trail under Dry Creek Road. We coordinated closely with the neighborhoods, South Suburban Parks District, and the

STATUS OF MAINTENANCE REHABILITATION PROJECTS

Project	Jurisdiction		Cost	Status
ADAMS COUNTY				
Clear Creek – S. Platte R. to York St.	Adams County	Design	$112,842	100%
Build drop structure to control grade.		Const.	295,100	100%
ARAPAHOE COUNTY				
Little's Creek – Gallup to Elati	Littleton	Design	33,620	100%
Drops and channel repair.		Const.	75,948	100%
Willow Creek – N. of County Line Rd	Centennial	Design	142,738	100%
Build drops to control grade.		Const.	484,844	100%
BOULDER COUNTY				
Dry Creek #2 – East of 55th Street	Boulder	Design	43,875	50%
Replace 3 broad drop structures.		Const	Next year	0%
Rock Creek – Farm west of Hwy. #287	Boulder County	Design	70,516	20%
Channel, bank repair and trails, partic.		Const	Next year	0%
BROOMFIELD COUNTY				
City Park D'way – Emerald to Midway	Broomfield	Design	33,678	90%
Channel and bank repair.		Const	Next year	0%
DENVER COUNTY				
Goldsmith Gulch, - North of Hampden	Denver	Design	66,480	100%
Channel and bank repair, participation.		Const.	800,000	90%
Cherry Creek – South Platte confluence	Denver	Design	Included	100%
Bank repair and access, participation.		Const.	75,000	10%
West Harvard Gulch – Zuni to Clay St.	Denver	Design	73,579	80%
Corridor study, drops, channel repair.		Const.	Next year	0%
DOUGLAS COUNTY				
Tallman Gulch – At Siebert Circle	Parker	Design	56,159	95%
Drops, channel repair, and trails, partic.		Const.	325,000	0%
JEFFERSON COUNTY				
Dutch Creek – Sheridan Blvd. to Eaton	Jefferson County	Design	49,941	10%
Drops and repair channel.		Const.	Next year	0%
Lakewood Gulch – Van Gordon-Welch	Lakewood	Design	Included	95%
Drops and repair channel, participation.		Const.	200,000	0%
Lena Gulch – Colfax at Zeta Street	Golden	Design	20,000	80%
Drops and repair channel, participation.		Const.	Canceled	0%
Lena Gulch – From 20th to Youngfield	Lakewood	Design	25,000	70%
Drops and repair channel, participation.		Const.	200,000	0%
Lilley Gulch – East of Pierce Street	Jefferson County	Design	51,054	100%
Drops and repair channel, participation.		Const.	242,908	100%
McIntyre Gulch – West of Holland St.	Lakewood	Design	Stalled	100%
Repair channel banks, participation.		Const.	265,000	0%

permitting agencies to make sure everyone recognized the same problem and envisioned the same solution. The eventual solution was a low impact regrading of the low flow channel through the accumulated sediments. Naturally, sediments will continue to accumulate requiring similar work in the future, but for now the riparian character of the area has been preserved.

Rehabilitation Maintenance

Sixteen rehabilitation projects were at various stages of design or construction during 2003. Those projects are listed in the accompanying table titled "STATUS OF MAINTENANCE REHABILITATION 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 2003 the District will have spent about $1,799,400 on rehabilitative design and construction for the year. A few of the unique projects are discussed below.

Vertical degradation on the South Platte River has migrated upstream in the channel of **Clear Creek** to the point that a previously installed bio-engineering bank protection project has been undermined and severely damaged. The encasement for a recent utility crossing has also been exposed. A seven foot tall grouted boulder drop structure was built on Clear Creek near its confluence with the South Platte River to control the grade of the channel. Our contractor cooperated with us in delaying the construction until the spring snow-melt runoff had passed.

Recent upstream urbanization in the **Willow Creek** basin in Douglas County resulted in renewed down-cutting and bank erosion just north of County Line Road in Arapahoe County. Four isolated grouted boulder drop structures were built with very little work done between the structures. This allowed most of the existing native grasses and thick trees to remain in what will now be a more stable setting. Since the Willow Creek watershed is in the plains we did not have to alter the construction schedule because of snow-melt runoff from the foothills. What we could not predict was the frequent runoff events as thunderstorms frequently rumbled across the southern part of the Denver area. Our contractor endured multiple weather delays during the construction.

Denver Parks Department initiated a large project on **Goldsmith Gulch** north of Hampden Avenue to control the low flow channel through an urban wetlands and to revitalize the recreational uses of the area. The project will also restore the ground water level for the wetlands. We joined with the parks department to assist with some of the channel restoration and to extend the project further south to repair a damaged channel in a commercial area. Two drop structures were built using a reinforced concrete foundation with a colored sculpted concrete covering. This gives the appearance of a natural rock outcrop. The District's Capital Program has built several of these structures over the past couple years including several in an award winning project.

Similar to last year several multi-purpose projects were funded this year through intergovernmental agreements. The result of this combined funding is projects that meet a variety of neighborhood needs. In one of the older Lakewood neighborhoods **Lakewood Gulch** had been relegated to being little more than a drainage ditch. The original development of the area pushed the creek around and between the lots simply to get it out of the way. The roadway crossings plus the dangerous erosion and steep banks will be addressed through a project using funding from the City of Lakewood, the Capital Program, and the Maintenance Program. The Town of Parker has a very different problem with **Tallman Gulch** which enjoys a relatively wide open-space corridor. We will participate by funding the drop structures to limit the down-cutting of the gulch while Parker will pay for the trail relocations and improvements.

Willow Creek at County Line Rd. before and after.

Maintenance Program GIS Activities

by
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The District is currently in the process of converting all of our Routine Maintenance aerial photographs to a GIS application. This is part of a larger effort by the District staff to create an integrated GIS system utilizing existing data developed by the District.

The District has approximately 500 11" X 17" aerial photographs, which are used for the Routine Maintenance Program. The photographs show drainageway location information, property boundaries, and work limits for mowing and debris removal. The photographs are part of the contract documents for the routine contractors, and are also used by District staff and other interested parties. These photographs quickly become outdated as adjacent areas are developed or other changes occur in the field.

The new images will utilize MRSID aerial photographs obtained from DRCOG. The new photographs are fit into our existing format, and a geodatabase with street names for all streets within the District boundaries was added to help locate drainageways. Mowing and debris removal limits and match lines were then added in a GIS shapefile format. Attributes in the shapefile will also include local government information, reach id's, and any specific notes for the particular location. The current plan is to update these photographs as needed to keep pace with development and changes in the field.

Once this conversion is completed, cost-tracking information will be added for all drainageways on which maintenance has been performed. This will then allow the District and interested local governments to track how much money was spent on a specific drainageway for a given period of time.