

# Maintenance Program Activities

by

**Mark R. Hunter, P.E., Chief, Maintenance Program**

---

## Routine Maintenance

Through the routine maintenance program \$629,800 was spent in 2002 for mowing and debris pickups. This work was done on approximately 245 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 debris pickup maintenance.

Adams County	19.5 miles
Arapahoe County	35.3 miles
Boulder County	16.4 miles
Broomfield County	0.2 miles
Denver County	44.7 miles
Douglas County	6.1 miles
Jefferson County	26.5 miles
TOTAL	148.6 miles

Many of the more urban drainageways now receive four or five mowings and seven or eight debris pickups per year. In the early 1980s the sole purpose of the routine program was to pick up large debris that could otherwise contribute to blockages and flooding problems. These days urban drainageway corridors are 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. Three or four debris pickups per year is now inadequate on the more urban drainageways that we maintain.

For the year 2002 we awarded eight separate contracts for routine work. All eight contracts were awarded through a direct competitive bid process. This was the second year all routine contracts were competitively bid. For the year 2002 we added a provision to the routine contract documents that will allow us to negotiate contract renewals for 2003 if we are satisfied with the contractor's work.

## Restoration Maintenance

In 2002 the restoration program completed \$2,392,500 of work. Restoration projects typically address isolated drainage problems where the construction will cost from a couple thousand dollars up to \$150,000. Eighty-eight 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.

In last year's *Flood Hazard News* article we discussed two weaknesses that can trigger the failure of drop structures. A drop can fail when water flows through, under, or around it due to an inadequate cutoff wall. In the second case, a drop can be damaged when the structure itself is not robust enough to withstand and dissipate the stream's energy. In 2002 we repaired more drop structures that suffered from water going through them or under them.

A baffled chute drop structure was built in the mid-1970s on **Niver Creek** at York Street in Adams County. This eight-foot tall structure was built without a cutoff wall to stop the subsurface movement of water. Recently this facility showed signs that it had problems when water got under the concrete then spurted a couple feet into the air at the bottom of the structure. We installed a steel sheet pile cutoff wall at the upstream end of the drop and used low pressure injection of concrete to fill the voids under the sloping panels of concrete.

We participated in the construction of a grouted boulder drop structure in 2000 on **Little Dry Creek** in Cherry Hills Village. In 2002 it began showing signs of water flowing under the apron of grouted boulders. Access to this site was limited and we wanted to try solving this problem without resorting to driving a sheet pile cutoff wall. We contracted with a firm specializing in concrete stabilization and had them inject their product in a grid pattern at varying levels under the drop structure.

We will monitor the results of this practical alternative to drop structure repair.

It is common to have utility lines cross streams. On **Big Dry Creek** in DeKoevend Park at University Boulevard and Arapahoe Road the stream had eroded such that the full barrel of an unprotected sewer line was exposed. With the financial assistance of the sewer district we reinforced the utility crossing, installed a sheet pile cutoff wall, and placed grouted boulders for the drop structure face. The structure is quite narrow in order to preserve the nearby park trees.

A very congested reach of **Skunk Creek** near 30<sup>th</sup> Street in Boulder has been eroding both vertically and horizontally for several years. A small grouted boulder drop structure will be built to carry the low flows. A concrete wing wall for a roadway culvert will be extended to control the lateral erosion. Two small wetland sites will be included in the construction.

The **Montbello** area of Denver is served by nearly 10 miles of concrete lined drainage channels. They have been constructed over the last 25 years as the subdivisions have been built. Their top widths vary from 12 feet up to 35 feet. Most of them were built without weep holes or substantial reinforcement. We set apart some funds each year to replace the very worst sections of these concrete channels. Our replacement concrete panels include weep holes and steel reinforcement.

Within the City and County of Denver we are participating with the Denver Parks Department in developing maintenance inventory reports for the major drainageways where large maintenance projects are still needed. Studies for **Harvard Gulch, West Harvard Gulch, Lakewood Gulch, Cherry Creek, and Sanderson Gulch** have either been completed or will be completed in 2003. 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. These studies assist the District and Denver in gaining perspective of the overall drainageway needs within the City and help allocate the limited funds to the most pressing problems.

Northeast of Pierce Street and Coal Mine Avenue in Jefferson County a beautiful corridor of native grasses and Crack Willow trees, some of them nearly 100 years old, has been preserved along with the right-of-way for **Coon Creek**. In a couple places the tree roots had intertwined to form two-foot to four-foot tall natural drop structures. Guidance from the community and the flexibility of our restoration contractors combined to produce low flow grouted boulder drop structures and limited bank protection that preserves the trees and will keep the creek from eroding the back yards.

Any channel built since March, 1980 must pass a design and construction review process if those drainage facilities are to be eligible for repairs and general upkeep by our drainageway maintenance program. **West Cook Creek** near Lincoln Avenue in the City of Lone Tree was designed and built to eligibility standards several years ago. A combination of sedimentation and localized erosion had recently caused standing water to occur in the channel. Since it qualified for maintenance assistance we reshaped the banks, built a short low flow drop structure, and revegetated the channel.

**Rehabilitation Maintenance**

Seventeen projects were at various stages of design or construction during 2002. 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 2002 the District will have spent about \$2,195,541 on rehabilitative design and

**STATUS OF MAINTENANCE REHABILITATION PROJECTS**

<b>Project</b>	<b>Jurisdiction</b>		<b>Cost</b>	<b>Status</b>
<b><u>ADAMS COUNTY</u></b>				
Clear Creek – S. Platte R. to York St. Build drops to control grade.	Adams County	Design	\$75,615	95%
		Const.	Next year	0%
Niver Ck, Trib M – N.E. of Huron St. & 88 <sup>th</sup> Ave. Drops & repair bank erosion.	Thornton	Design	43,600	100%
		Const.	293,053	100%
<b><u>ARAPAHOE COUNTY</u></b>				
East Toll Gate Trb. – Along Uravan Av Drops and channel repair	Aurora	Design	159,640	100%
		Const.	538,422	100%
Little's Creek – Gallup to Elati Drops and channel repair	Littleton	Design	33,620	50%
		Const.	Next year	0%
Willow Creek – N. of County Line Rd Build drops to control grade	Centennial	Design	67,450	50%
		Const.	Next year	0%
<b><u>BOULDER COUNTY</u></b>				
No Changes in 2002				
<b><u>BROOMFIELD COUNTY</u></b>				
No Changes in 2002				
<b><u>DENVER COUNTY</u></b>				
Cherry Creek – Highline canal crossing. Repair drop structure, participation	Denver	Design	Included	100%
		Const.	439,550	100%
Goldsmith Gulch, - North of Hampden Channel and bank repair.	Denver	Design	66,000	100%
		Const.	815,000	0%
<b><u>DOUGLAS COUNTY</u></b>				
Big Dry Creek – In Heritage Park Drops and repair steep banks, partic.	Douglas County	Design	By others	100%
		Const.	300,000	100%
Tallman Gulch – At Siebert Circle Drops, channel repair, and trails	Parker	Design	53,559	50%
		Const.	Next year	0%
<b><u>JEFFERSON COUNTY</u></b>				
Coon Creek – West of Sheridan Blvd Drops and repair eroding channel.	Jefferson County	Design	44,610	100%
		Const.	145,626	100%
Lakewood Gulch – Van Gordon-Welch Drops and repair channel, participation	Lakewood		Included	40%
		Const.	200,000	0%
Lena Gulch – Colfax at Zeta Street Drops and repair channel, participation.	Golden	Design	20,000	60%
		Const.	Next year	0%
Lena Gulch – From 20 <sup>th</sup> to Youngfield Drops and repair channel, participation.	Lakewood	Design	25,000	30%
		Const.	Next year	0%
Lilley Gulch – Wadsworth to Estes Repair channel and trail.	Jefferson County	Design	70,171	100%
		Const.	280,240	100%
Lilley Gulch – East of Pierce Street Drops and repair channel, participation	Jefferson County	Design	49,918	100%
		Const.	233,899	20%
McIntyre Gulch – West of Holland St. Repair channel banks, participation.	Lakewood	Design	Included	100%
		Const.	265,000	0%
S.J.C.D. North – West of Sheridan Blvd Floodplain determination.	Jefferson County	Design	11,134	100%
		Const.	No const.	0%

construction for the year. A few of the unique projects are discussed below.

Several regional and local governments participated with us in rebuilding some critical facilities on **Cherry Creek**. In southeast Denver where the Highline Canal crosses Cherry Creek there was a massive 12 foot tall drop structure composed of dumped concrete rubble. Erosion had exposed the Highline Canal siphon under the creek and the rubble appeared inadequate to resist a major flood event. This project was a tremendous multi-party success that resulted in a substantial grade control structure plus trail and park improvements for the large open space area.

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. Design is underway for a grouted boulder drop structure on Clear Creek near the confluence with the South Platte River to control the grade of the channel.

The **East Toll Gate Tributary** in Aurora had several grouted riprap drop structures with deep stilling basins that drained into an 18-inch diameter trickle flow/underdrain pipe. The pipe was damaged or plugged in several areas. The drops were deteriorated and had

become a safety problem because of the deep stilling basins. Rebuilding the drop structures and regrading the channel allowed all runoff to flow on the surface through the improved corridor.

Creeks in our semi-arid region tend to have a mind of their own when it comes to the width to depth ratio for the low flow channel. **Harvard Gulch** flows through DeBoer Park in south Denver. It had a thin slope-paved concrete trickle channel that had become displaced and broken-up. Last year the five-foot wide concrete trickle channel was replaced with a boulder-edged low flow channel that varies from 12 to 18 feet wide. The outcome is an attractive creek corridor through an irrigated park. An additional feature that has developed over the past year is that the creek has deposited sediment in the now-wider low flow channel. The result is mounds of material and volunteer vegetation scattered throughout the creek alignment that have become a maintenance issue for us and the parks department.

Denver Parks Department initiated a large project on **Goldsmith Gulch** north of Hampden Avenue to control the low flow channel through an urban wetlands area. The project will also restore the ground water level for the wetlands and

will relocate a playground. 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. The combined efforts will produce a well coordinated project with two damaged reaches of the gulch being repaired in a single effort.

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 Highlands Ranch, Douglas County we cooperated with the Highlands Ranch Metro District to build trails and creek crossings and to construct channel improvements on a portion of **Big Dry Creek** where the subdivision developer had stayed completely out of the floodplain during his development activities. Multi-party funding also helped us on **Lilley Gulch** in Jefferson County east of Pierce Street. On this project we cooperated with Jefferson County Open Space in adding a portion of Lilley Gulch to their active park areas. This was accomplished by reshaping an abandoned irrigation pond and by constructing drop structures and wetlands.

**Harvard Gulch Low Flow Channel**



**Before construction**



**Immediately after construction**



**One year later**

## **Vegetation Thinning within Minnesota Drive Tributary**

By Libby Kaiser, Student Intern

Regular routine mowing of portions of the Minnesota Drive Tributary prevents overgrowth of vegetation around the storm sewer outlets draining to Cherry Creek. Despite the mowing at the outlets the rest of the stormwater channel had become a tangled mess of invasive weeds, shrubs, suckers and dead branches.

This gnarled jungle was thinned out in July, 2002, to restore capacity and facilitate maintenance of Minnesota Drive Tributary. This tributary runs parallel to Cherry Creek along residential backyards between Monaco and Holly Street in Denver, Colorado.



**Before and after views of Minnesota Drive Tributary.**

A private contractor was paid \$4,490.00 to cut and remove all woody vegetation within the channel as well as remove the lower branches of mature trees up to a height of approximately six feet above the ground. The result is a drainageway free of organic debris that more

effectively prevents flooding near the homes that line its southern bank while also facilitating access by maintenance crews.