# FINAL REPORT

## Glenwood Springs Municipal Airport
## Rubber-Asphalt Pavement Project
## June 13-16, 2003

In a unique coordination of multiple organizations and funding sources, the **Glenwood Springs Municipal Airport** rubber-asphalt pavement project was completed in June 2003. The objective of the project was to improve the usability of the Airport while provide a test platform for the use of rubber-asphalt paving materials for general aviation airport maintenance.

Rubber-asphalt paving materials contain an approximate 20-25% recycled waste auto tire rubber, mixed with asphalt binders and heated to approximately 400 degrees for about an hour, in order to adhere the material to the aggregate. In the 30,000 sq. yards of pavement rehabilitation which comprised runway, taxiways and parking apron at the **Glenwood Springs Municipal Airport**, more than 4800 recycled tires were used.

The validity of rubber-asphalt paving materials had been proven by our sister states of California and Arizona, which rely heavily on the process to provide a significant increase in the longevity of the pavement and the wise recycling of used auto tire products. Reflective cracking has all but been eliminated with this process and the pavement remains flexible and viable long after non-rubberized materials have failed.

In the past, the acute stresses placed on pavements at high altitude Colorado airport locations have made it necessary to rehabilitate airport movement areas every two- to three-years. It is anticipated that the introduction of the rubber-asphalt materials will extend the life of the pavements for 7 to 10 years.

The CDOT-Aeronautics Division will closely monitor the status of airport surfaces during the anticipated lifecycle of the pavement. The Division has in place a triennial pavement condition inspection for all airport surfaces in Colorado, which provides a means of profiling this pavement as it compares with past pavement history at the Airport and at other airports with similar climatic conditions.

## METHOD AND MATERIALS

The pavement resurfacing and auto tire recycling project at **Glenwood Springs Municipal Airport** was envisioned as a test platform to confirm the results of similar uses at Texas, Arizona and California general aviation airports.

The process used in the rehabilitation of the **Glenwood Springs Municipal Airport** is called a *Cape Seal*. First, cracks in the existing pavement are filled with rubberized crack sealant. Then a SAM – stress absorbing membrane - of rubber asphalt materials is sprayed in a heavy coat on the surface of the existing pavement and followed immediately with a screening of heated aggregate. This layer is rolled several times and allowed to cool and set up; then a second coat of rubber asphalt is sprayed in a heavy coat to completely cover and seal the aggregate in place. When adequately set up, the pavement receives runway markings in accordance with Federal Aviation Administration guidelines.

The whole process at Glenwood Springs was completed in four days. The project experienced some unanticipated delays when the local supplier of aggregate was not able to keep up with the demand for critically heated materials. But, as a result of the slower pace, the work was done very cautiously and carefully followed best industry practices.

Of critical importance to the longevity of the rehabilitated surface is the underlying substantial base, comprised in the existing pavements, which was in excellent condition. Rubber asphalt provides a smoother, more quiet operational surface and delays further maintenance three-fold.

The project was initially scheduled for the late summer of 2002, but was delayed until spring 2003 because contractors' bids exceeded the project budget available. When re-bid, project costs were lower; and funding shortfalls were honored with additional participation by the Colorado Discretionary Aviation Grant program.

Now begins the process of monitoring the performance of the rubber asphalt pavement at the **Glenwood Springs Municipal Airport**. The Division has in place a sophisticated pavement condition inspection program, which profiles the condition of the existing pavement and makes recommendations for future maintenance needs. This program has been in place for a number of years, so considerable information exists pertaining the life-cycle of pavements at this and other mountain airports. Over the anticipated life of the pavement, careful comparisons with past performance can now be made.

## PROJECT FUNDING AND COSTS

Critical materials for the project included certified Colorado waste tires as part of the Colorado Department of Local Affairs Waste Tire Grant Program to underwrite projects using waste automobile tires.

U.S. Environmental Protection Agency Solid Waste Management Program funding underscored the need for prudent management of solid waste materials in long-term programs that improve the community infrastructure while making wise decisions about recycling.

The Colorado Discretionary Aviation Grant program mandate requires all efforts be made to maintain and improve the State aviation system plan. Anticipating the long-term benefits from the use of rubber asphalt materials at similar locations statewide, the CDOT-Aeronautics Division anticipates expanding its efforts to complete like projects in the near future.

The City of Glenwood Springs, as owner and sponsor of the **Glenwood Springs Municipal Airport**, assumes the responsibility for the future maintenance and control of the Airport and assures its continued access as a public-use general aviation facility serving their community and the surrounding area.

The total costs of the project were $147,283.00.
*Life cycle 7-10 years*

Funding breakout is as follows:

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| U.S. Environmental Protection Agency Solid Waste Program | $26,900.00 |
| Colorado Waste Tire Grant Program | $25,000.00 |
| City of Glenwood Springs | $17,940.00 |
| Colorado Discretionary Aviation Grant Program | $77,443.00 |

Project costs for traditional pavement maintenance might be as follows:

Type II Slurry seal, crackfill and remark $86,000.00
*Life cycle 1-2 years*

2-Inch asphalt mat Overlay,
crackfill and remark $300,000.00
*Life cycle 3-5 years*

Over the anticipated life-cycle of the project, cost savings are considerable when compared to other non-rubberized products. At the same time, the prudent use of waste materials even more significantly impacts the value of the project.

The **Glenwood Springs Municipal Airport** rubber asphalt pavement project provides:

a safer, more skid-resistant surface than traditional maintenance methods can provide because it is open-graded and drains well during inclement weather,

an opportunity to extend the life of the airport surfaces,

a test platform for the continued use of rubber asphalt materials on similar projects statewide,

demonstration of the potential of rubber asphalt paving materials as a market for waste auto tires in Colorado,

a valuable waste auto tire recycling opportunity,

maintenance of a valuable link in the aviation system in Colorado,

a critical -economic and emergency link for the citizens of the area.

# PUBLIC AWARENESS OF PROJECT SUCCESS

The CDOT-Aeronautics Division maintains an excellent rapport with statewide community airports. Airport managers, always looking for a better way to keep their airports in top condition, have been briefed on the use of rubber asphalt materials at the **Glenwood Springs Municipal Airport**. Several, who expressed interest in similar projects on their facilities, were invited to observe the process while underway.

The Division newsletter, *Mountain Wave*, available in hard copy and via the internet site, www.colorado-aeronautics.org includes a comprehensive discussion of the project, including photos of its progress.

CDOT-Aeronautics Division Airport Engineer, T.K. Gwin, was interviewed by ***Colorado Public Radio*** regarding the success of the project. The interview, included in the daily public-interest program on CPR, *Colorado Matters*, was aired in late July.

The Colorado Aeronautical Board, who set priorities for the CDOT-Aeronautics Division, has closely monitored the project from the onset. They have been fully briefed on the success of the pavement project and will continue to follow the materials' performance here and at future projects.

The CDOT-Aeronautics Division staff will brief members of the Colorado Airport Operators Assn. about the success of the project during its annual fall conference planned for Steamboat Springs in early October, 2003.

## FUTURE FUNDING AND USES

Because of the far-reaching aspects of further projects incorporating rubber asphalt, the Division will endeavor to find subsequent, additional funding to complete similar projects where the airport use and conditions are appropriate.

The CDOT-Division of Highways has used rubber asphalt paving materials in the 1970's. Because the size of the rubber chunks was considerably larger than the process currently favored, only minimal success was realized. Recently, however, a road and bridge-paving project was completed along Colfax Ave., in Aurora.

Unlike the CDOT-Division of Highways, which operates with significant amounts of highway users tax funds, the only funds currently available to the CDOT-Aeronautics Division are those aviation fuel taxes earmarked for the discretionary grant program. With limited funding likely for the foreseeable future, the extended life of the rubber asphalt pavements is very attractive to the Division. Staff will be busy searching for additional project budget sources.

With the anticipated positive results from the Glenwood Springs project, the Aeronautics Division intends to continue the use of rubber asphalt on general aviation airports where appropriate.