STATE OF ARIZONA
OFFICE OF THE
AUDITOR GENERAL

Arizona Department of Transportation—Highway Maintenance

REPORT HIGHLIGHTS
PERFORMANCE AUDIT

Subject

ADOT was established in 1974 and is charged with planning, designing, constructing, maintaining, and operating the State's highway transportation infrastructure. The Intermodal Transportation Division is responsible for highway design, construction, and maintenance.

Our Conclusion

Money for highway maintenance represents about 10 percent of ADOT's highway funding, supporting about 250 maintenance activities throughout the State. Arizona's highway system has mostly smooth and good-quality pavement and was in better condition in 2005 than in 1995. The Division could better measure and identify annual maintenance work needed to maximize the state highway system's life, efficiency, appearance, and safety. The report also provides information on litter control.

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Maintenance monies support numerous activities

The Division maintains an expanding state-wide road system that includes interstate highways and U.S. and state routes. The Division maintains more than 27,000 maintenance lane miles that include all travel lanes, ramps, passing lanes, paved shoulders, and unpaved roads.

The State's transportation infrastructure was worth more than $9 billion as of June 30, 2006.

Nine districts—The State is divided into nine districts that handle most highway maintenance for their geographical areas. Maintenance of a highway extends from the right-of-way fence on one side of the road to the other side. This work includes:

- Surface maintenance, such as filling potholes and sealing cracks;
- Shoulder maintenance, such as repair and blading;
- Roadside maintenance, such as guardrail and fence repair;
- Drainage maintenance, such as clearing drains and ditches; and
- Removing obstructions, debris, snow, and ice.

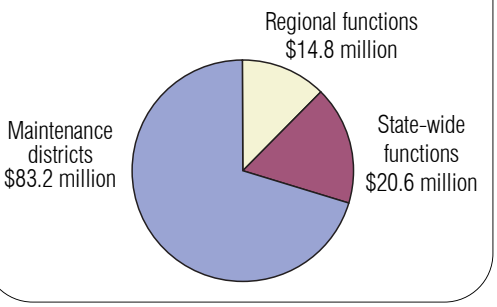
Some functions, such as highway striping, lighting, and traffic signals, are conducted on a regional basis.

Further, the Division paid more than $17.5 million to private contractors who provided some maintenance services.

Photo courtesy of Valley Slurry Seal Co.

Maintenance expenditures—Maintenance constitutes about 10 percent of ADOT's highway expenditures. ADOT's Highways Program has almost $1.2 billion available for fiscal year 2007, of which the Legislature appropriated $118.6 million for highway maintenance—materials, equipment, contractors, and facilities. Most of these monies go to the nine maintenance districts.

Allocation of Maintenance Dollars
Fiscal Year 2007



The Division has identified and tracks expenditures for 250 highway maintenance activities, which we grouped into general categories. Although many people may equate the term "highway maintenance" with maintaining pavement—such as filling

potholes—paved surfaces account for slightly less than 9 percent of ADOT's total maintenance expenditures. The major maintenance expenditure categories include:

- Roadside ($19 million)—Mowing, litter pickup, guardrails, fences
- Traffic ($12.4 million)—Signs, signals, pavement markings
- Other ($10.1 million)—Materials handling, building and yard maintenance, contracts for prison labor
- Paved surfaces ($9.6 million)—Crack/pothole filling, seal coats
- Landscaping and plants ($7.6 million)
- Rest areas ($6 million)
- Winter ($2.4 million)—Snow removal and deicing

In addition to the legislative appropriation for maintenance, the Division also expends money from two other sources. One is from nonappropriated highway construction monies for pavement preservation projects. Highway preservation involves grinding (milling) off the top 1-3 inches of the pavement and replacing it with asphalt. This adds about 10 years to pavement life. In fiscal year 2006, ADOT spent $77.3 million preserving approximately 399 lane miles and has budgeted $103.4 million for pavement preservation in fiscal year 2007.

Maricopa County voters approved another funding source by passing Proposition 400 in November 2004, extending the County's one-half cent transportation excise tax. A portion of this is allocated to regional highway maintenance. That allocation is worth about $279 million between fiscal years 2006 and 2025. For each of fiscal years 2006 and 2007, $5.7 million was allocated to ADOT and is used for landscape, litter control, and sweeping.

Most Arizona pavement rated satisfactory

Well-maintained pavement provides various benefits, including increased safety, fewer auto repairs, improved quality of the overall road network, and higher user comfort, according to a Kentucky research report.[1]

Pavement quality is determined by measuring the roughness in inches over a mile, the extent of cracking, patching, and asphalt oil seepage, rut depth, and friction amount. Specialized crews survey all Arizona highways, collecting data by observation and special equipment.

Arizona's pavement smoothness compares favorably with other states. For 2005 (the most recent data available), Arizona's good ratings for interstate roads were higher than for all five contiguous states, while its good ratings for other roads were ranked third.

Arizona's ratings for smoothness and other quality factors were better in 2005 than in 1995.

State Comparison of Pavement Smoothness
Calendar Year 2005

	Percentage with Good Rating[1]
Interstate Highways	
Arizona	95.2%
New Mexico	92.8
Nevada	88.1
Utah	72.5
Colorado	50.8
California	50.2
Other Roads	
Nevada	96.4%
New Mexico	78.4
Arizona	70.5
Utah	59.1
California	53.0
Colorado	52.8

[1] A "good" rating is defined as roads receiving an International Roughness Index rating of less than 95, which measures the inches of bounce a vehicle will experience over one roadway mile.

1 Kreis, Doug, Lenahan O'Connell, and Brian Howell. *Long-Term Maintenance Needs Planning*. Lexington, KY: Kentucky Transportation Center, College of Engineering, University of Kentucky, 2005.

Improved approach needed to determine maintenance needs and allocate money

Although maintenance funding has increased, so have maintenance costs and demands. Highway maintenance expenditures increased 56.6 percent between 1997 and 2006. Pavement preservation spending fluctuated between $66 million to $115.5 million, except for increased federal funding in 1998 and 1999 that increased the total for those years to $169.8 million and $196.2 million, respectively.

Increased material costs—Highway maintenance material costs have been increasing and, as a result, the Division has been doing less preventive maintenance. As an example of the increases, the cost of asphalt has gone up 171 percent from 1997 to 2006. The overall construction price index has risen 58 percent during this same period.

Changes in Selected Construction Costs
As of August 2006

	Asphalt	Cement	Steel	Overall
Past year	77%	11%	11%	14%
Past 5 years	*	33	59	41
Past 10 years	171	48	49	58

* There is a gap in the data for asphalt that prevents a calculation of the price change over this time span.

Increased demand—Not only has the cost of maintenance increased, but the demand for maintenance has also increased. For example, between 1997 and 2006:

- Travel lane miles increased 8 percent in total.
- The proportion of urban lane miles increased, producing increased costs for landscaping, median barriers, lighting, etc.
- Traffic volume increased 59 percent.

Further, the time ADOT maintenance crews spent on emergency incidents increased 25 percent just between 2004 and 2006.

Other demands have also increased maintenance costs and workload. For example, ADOT officials state that public expectations now require ADOT to use deicing chemicals instead of less-expensive cinders to clear winter roads.

According to ADOT, there is a widening gap between current resources and maintenance needs, but it was unable to document the extent of the gap.

Planning process lacking—State-wide and district annual maintenance budgets are mainly based on past years' budgets and not on the annual work that needs to be done. There are no district or state-wide guidelines to help identify maintenance needs or how to prioritize them. The Division's allocation of most maintenance monies does not consider miles, traffic volume, population changes, and other factors that affect the workload. As a result, some districts may be able to do even the lowest-priority work, while others may struggle to accomplish higher-priority work. A comparison of district maintenance budgets shows significant differences in budget amounts per miles of highways and per vehicle miles traveled (VMT) in the districts.

Comparisons of District Budgets

	Budget per Mile	Budget per VMT[1]
Average district ratio per category	$2,796	$1.47
Lowest district ratio per category	1,627	0.53
Highest district ratio per category	4,745	3.39

1 Traffic volume is measured by daily vehicle miles traveled (VMT). A "vehicle miles traveled" unit is one vehicle traveling the distance of one mile. Thus, total vehicle miles traveled is the total mileage traveled by all vehicles.

The Division should establish maintenance and inspection frequency schedules and guidelines to help identify and prioritize needed maintenance work.

The Division has taken some steps to better measure its maintenance needs, such as developing four computerized systems. Although the Division has high expectations for these systems, they are not yet fully developed or in use. Consequently, their effectiveness cannot yet be judged.

As it implements the computer systems, the Division should also implement a systematic planning approach that would identify maintenance needs state-wide, provide a method to prioritize needs, and provide a systematic method for allocating resources.

Recommendations

The Division should:

- Develop and implement guidelines to identify and prioritize needed annual maintenance work.
- Identify, quantify, and prioritize all annually needed maintenance work.
- Identify work that cannot be done with existing resources to quantify any maintenance funding gap.
- Develop and implement a methodology that ensures systematic allocation of resources based on state-wide needs and priorities, and districts' or regions' needs and responsibilities.

Other pertinent information on litter control

The Division is responsible for managing litter control on state-maintained roads. ADOT uses paid contractors, the Adopt-a-Highway program, prison labor, and in-house maintenance crews to control litter.

ADOT schedules each roadway mile in the greater Phoenix area for weekly litter pickup, done mostly by private contractors. In fiscal year 2006, $1.8 million in Maricopa County's Proposition 400 monies was designated to pay for contracted litter pickup. The Maricopa Association of Governments used another $200,000 in Proposition 400 monies for litter prevention and education.

Adopt-a-Highway sponsors in Phoenix, Tucson, and Flagstaff contract with preapproved maintenance contractors for litter control. This litter pickup occurs typically every other week, although in Flagstaff and Tucson, some sponsored litter pickup is done only 12 to 18 times per year.

Volunteer groups are also involved in the Adopt-a-Highway program. As of February 2006, ADOT had 2,235 volunteer groups assisting in litter control on 2,467 roadway miles.

ADOT also used about 86,000 hours of prison labor to perform litter pickup along some Arizona highways. The total cost of this work was almost $62,000 in fiscal year 2006.

Finally, ADOT maintenance crews pick up litter in rural areas only in response to complaints or to address obvious safety hazards.

TO OBTAIN MORE INFORMATION

A copy of the full report can be obtained by calling (602) 553-0333

or by visiting our Web site at: www.azauditor.gov

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