

# Transportation Asset Management Case Studies

Presented by



U.S. Department  
of Transportation  
**Federal Highway  
Administration**

HIGHWAY ECONOMIC REQUIREMENTS SYSTEM-STATE

## The New Mexico Experience





A steep grade and beautiful fall colors at Hyde Park Road just north of Santa Fe.

**FRONT COVER PHOTO:**

One of many picturesque Interstate structures in New Mexico, this one over I-84/285.

## Note From the Director

With factors such as an aging national infrastructure, increasing congestion and limited funds weighing heavily on transportation agencies, State departments of transportation (DOTs) are looking for innovative ways to manage their transportation dollars.

One tool that is providing great benefits is Transportation Asset Management (TAM), a strategic approach that strives to provide the best return for each dollar invested by maximizing system performance, improving customer satisfaction and minimizing life-cycle costs.

TAM endeavors vary from State to State and include efforts in the areas of data integration, economics in asset management, the utilization of Highway Economic Requirements System – State Version (HERS-ST), life-cycle cost analysis (LCCA), preservation, and pavement and bridge management, among others.

Because each State's experience is unique – and because FHWA believes that transportation agencies work more efficiently when information on one another's successes is shared – the Office of Asset Management is continuing its series of TAM case study reports begun in 2002.

On behalf of the Office of Asset Management, I am pleased to add this case study on HERS-ST to the series. I believe that each of the five case studies generated this year (one on LCCA, two on HERS-ST and two on comprehensive TAM efforts) will help transportation agencies meet the increasingly complex challenges facing them today.



David R. Geiger  
Director, Office of Asset Management  
October 2006

## Note to the Reader

The TAM case study series is the result of partnering between State departments of transportation and the Federal Highway Administration's (FHWA's) Office of Asset Management. FHWA provides the forum, and the States furnish the details of their experiences with asset management.

For each case study, FHWA representatives interview State transportation staff and compile the information, and the State approves the resulting material. Thus, the case study reports rely on the agencies' own assessment of their experience. Readers should note that the reported results may not be reproducible in other organizations. ■



Work on Chimayo Cut.

## Executive Summary

New Mexico is the country's fifth largest State, ranks 36<sup>th</sup> in the country in terms of population and is home to rugged terrain, 75 percent of which is at an elevation of 4,000 feet or higher. Steep grades, changing weather and a lack of paved roads (26 of the State's 33 counties do not own a paved road) only serve to complicate the transportation matrix. Thus, it comes as no surprise that developing and managing New Mexico's transportation assets is a paramount challenge.

And the New Mexico Department of Transportation (NMDOT) has risen to the challenge. The agency delved into asset management by developing its own long-range planning software in the late 1990s. When database changes forced a change, the State joined the HERS-ST national pilot program in February 2001.

New Mexico did not take its participation in the pilot program lightly; rather, the agency committed the necessary resources to make the most of the HERS-ST program. New Mexico staff attended the national kickoff; tested the HERS-ST pilot software; provided feedback to the Office of Asset Management; and joined the developers' group that helps prioritize software changes.

Like many DOTs, New Mexico utilizes HERS-ST to develop its list of needs for the DOT's long-range plan. However, New Mexico has taken the application one step farther by developing a series of customized reports and by using HERS-ST to conduct benefit-cost analyses on potential projects for the New Mexico State Legislature. The State sees the software as completely customizable and is looking to conduct specialized sensitivity analyses and prepare HERS-ST-generated systems condition summaries in the near future. ■

## AGENCY FACTS

Created by the State Legislature in 1909, New Mexico's Highway and Transportation Department became the New Mexico Department of Transportation in 2003. The New Mexico State Transportation Commission oversees the establishment of DOT policy, while the cabinet secretary handles day-to-day operations. Coordination with the State's four metropolitan planning organizations (MPOs) and seven regional planning organizations (RPOs) comprises a major part of the department's planning efforts.

The DOT is made up of six districts; owns 3,000 on-system and 714 off-system bridges; is responsible for 27,920 of the State's 61,384 centerline miles; and has an annual budget of approximately \$700 million. About 76 percent of the DOT's 2,400 employees work out of the DOT's six districts at 81 patrol yards. DOT headquarters is located in Santa Fe.

The DOT's vision is to be an "international leader" and "inventors and providers of a transportation system that serves everyone." The agency employs seven guiding principles to further that vision. They include adherence to a multimodal transportation system; partnership with tribal governments; partnership with local governments; creation of an environmentally responsible transportation system; provision of safe and secure transportation; the efficient use of public resources; and support of the economic vitality of the State and the Nation.



New Mexico's Rail Runner crossing a trestle bridge.

New Mexico Governor Bill Richardson has played a prominent role in promoting the DOT's vision of providing a transportation system that serves everyone. In November 2003, he signed House Bill 15, which will fund 1) approximately \$1.6 billion in road improvements, and 2) the development of a commuter rail service that will serve thousands of citizens and visitors. The initiative, known as Governor Richardson's Investment Program (GRIP), is slated to provide \$10.6 billion in direct benefits to highway users, in maintenance savings and in the future value of infrastructure. NMDOT assisted with the GRIP planning process by running HERS-ST benefit-cost analyses for each potential project.

## SETTING THE STAGE

### What Did New Mexico Have?

New Mexico has had some version of an asset management program since the early 1980s, when it utilized the Pavement Management System (PMS), along with district input, to determine system priorities. That system served as the primary means for project prioritization until the late 1990s, when the DOT developed its first long-range plan.

The goal was to come up with a viable means to chart long-term needs, but the first plan had what department analysts call "a lot of feel-good statements." The DOT had good data but no reliable method for analyzing that data 20 years out.

In an effort to address those needs, New Mexico developed long-range program (LRP) software that utilized information from the consolidated highway database (CHDB). The program extracted information on various deficiencies such as surface roughness from eight separate reports. NMDOT soon discovered that the program was difficult to use and over-estimated the State's needs.

Then, within just two years, the DOT decided to migrate from a main frame to desktops, which meant that the LRP software would have to be rewritten or replaced. As the State weighed its options, the DOT received an invitation to the national kickoff for the HERS-ST pilot program. A department planner and two information systems staff members, along with representatives from 16 other States, attended the event in February 2001.

## What Did New Mexico Want?

Limited transportation funds and an increase in pavement needs were driving the State to more data-based analyses. As a result, New Mexico was looking for a program that provided a comprehensive systems condition analysis, specifically a comparison of urban versus rural systems. The State also wanted a program that it could customize.

At the end of the pilot program, NMDOT identified three key areas of concern with HERS-ST: 1) the program was DOS-driven; 2) it could only process Highway Performance Monitoring System (HPMS) data in the program's 1993 format (HPMS had changed its format in 1997, which meant that the pilot model was using an obsolete HPMS format); and 3) HERS-ST did not provide concise summary reports. NMDOT wanted a program that was Windows-based, operated on a current data form, and could generate succinct summary reports and customized documents as needed. FHWA's Office of Asset Management reviewed the comments from the participating States and began refining HERS-ST, making it much more user-friendly and responsive to State needs. That commitment to improving the model made it "very attractive" to NMDOT.



## HOW DID NEW MEXICO GET THERE?

Even with all of the refinements to the pilot software, NMDOT found the pilot version of the HERS-ST software lacking in terms of report options, an issue that has been addressed with subsequent program updates. Undaunted, NMDOT's planners began manipulating HERS-ST data and generating their own customized reports.

Creating these documents required in-depth study of the nuances of HERS-ST and creation of multiple layers of formulas in various Excel spreadsheets. NMDOT's Transportation Fact Sheet, for example, takes the improvement costs calculated by HERS-ST by funding period, by rural and urban designation, and by functional class and multiplies the improvement costs times the benefit-cost ratio generated by the program to compute total user benefits. NMDOT's goal in preparing this report was to present the basic information on engineering needs and projects with a benefit-cost ratio of 1.0 or greater in a concise, straightforward manner.

And NMDOT's outside-the-box thinking didn't stop there. When the State was looking at expanding a 235-mile stretch of US 54 to support two lanes of traffic in each direction, it employed HERS-ST to consider a four-lane option and analyze factors such as vehicle miles traveled (VMT), vehicle hours traveled (VHT), delay times and so forth. Utilizing Regional Economic Models, Inc. (REMI) Policy Insight/TranSight methodology in conjunction with the HERS-ST data, the State was able to determine that the benefits of the proposed expansion would be to commercial freight carriers and travelers to Texas rather than to New Mexico residents!

Finally, NMDOT showed its commitment to HERS-ST by supporting the planning division's involvement with the HERS-ST developers' group. That group meets two to three times a year to evaluate comments and work on software changes and priorities.

**New Mexico Department of Transportation**  
*Transportation Fact Sheet*

**TWENTY-YEAR HIGHWAY NEEDS AND USER BENEFITS OF IMPROVEMENTS**

Benefit/Cost Basis  
In \$1,000s

URBAN NEW MEXICO Years	Interstate		Principal Arterial		Minor Arterial		Collector		TOTAL	
	Needs	User Benefits	Needs	User Benefits	Needs	User Benefits	Needs	User Benefits	Needs	User Benefits
1st Five	738,228	3,772,345	613,573	7,092,904	95,719	727,464	132,121	1,167,950	1,579,643	12,763,515
2nd Five	457,520	1,843,806	41,384	112,978	10,009	45,141	13,272	48,443	522,187	2,046,973
3rd Five	610,930	2,455,939	123,767	373,776	18,338	37,043	2,006	15,205	755,044	2,884,268
4th Five	847,282	2,762,139	108,574	398,467	8,019	24,699	26,713	101,509	990,590	3,288,759
<b>TOTAL</b>	<b>2,653,960</b>	<b>10,834,229</b>	<b>887,298</b>	<b>7,978,125</b>	<b>132,085</b>	<b>834,346</b>	<b>174,112</b>	<b>1,333,107</b>	<b>3,847,464</b>	<b>20,983,515</b>

**March 2005**

2003 HPMS Dataset: State-Owned Roads Only; No Rural Minor Collectors or Local Roads Included  
Analysis by FHWA's Highway Economic Requirements System-State Version (HERS-ST)

## WHERE IS NEW MEXICO TODAY?

New Mexico has used HERS-ST to develop the need projections for its long-range plan since the program's inception, with HERS-ST fully integrated into NMDOT's long-range-plan process by 2003.

New Mexico is exploring the use of HERS-ST as an asset management tool and is using it to prioritize corridor needs in the long range planning process.

That wasn't always the case. Prior to 2005, the DOT's planning division used a full engineering needs analysis for estimating future highway needs.

In 2005, however, when the Governor's Infrastructure Conference asked for a summary of New Mexico's highway needs, the planning division suggested a new approach – using the constrained number from a HERS-ST analysis instead of the traditional method. The bottom line? NMDOT had to have a credible number.

The HERS-ST number that New Mexico provided showed \$11 billion in 20-year needs, a lower number than what had been provided in years past. When questions arose about that “lower” number, NMDOT planners explained that this figure represented projects with a benefit-cost ratio of 1 or more. It wasn't what the DOT had provided in years past – a list of every project that anyone could think of.

And NMDOT already sees the usefulness of HERS-ST expanding as State DOTs strive to meet requirements in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), namely estimating the maintenance costs of planned improvements and establishing the operational functionality of a system. “We can address these issues in our long-range plan utilizing HERS-ST,” says Senior Planner Roy Cornelius.

### **Seven Ways NMDOT Uses HERS-ST**

- Determining long-range planning needs.
- Calculating benefit-cost ratios for all “GRIP” projects.
- Generating system condition summaries.
- Estimating maintenance costs.
- Estimating operational costs.
- Calculating impacts on highway users at different funding levels.
- Providing a “user interface” to access and view (via GIS, tables and graphs/charts) highway data in one location.

## WHAT HAS NEW MEXICO LEARNED?

New Mexico has brought a number of lessons away from implementing and utilizing HERS-ST.

The first is that successful integration of HERS-ST into the decision-making process requires a HERS-ST “champion” at multiple levels, i.e., planner and division director.

The State learned rather quickly that becoming and staying actively involved in the refinement of the HERS-ST software is vital to having a product that meets the DOT’s needs. The best way to do that is to become involved with the developers’ group and dedicate a staff person’s time to attend the group meetings throughout the year. NMDOT’s planning division sees continued involvement in the developers’ group as essential to providing a program that meets the States’ asset management needs; it allows DOTs to address asset management issues in a non-political forum.

New Mexico has found that analyzing the benefit-cost ratio of a given project utilizing HERS-ST can be a challenge, as the project might not be located where the data has been sampled. When that happens, the DOT must utilize area sample data to draw its conclusions. New Mexico has addressed this concern by developing a 100 percent database (excluding rural minor collectors).

Another factor that New Mexico struggles with is the reliance on national cost default data; spikes and dips in the local market are not reflected in the default data. The Office of Asset Management highly recommends that each user update/modify the cost data to accurately reflect their State/locality, as this is key to attaining more accurate results.

Finally, the DOT discovered the importance of taking advantage of the free HERS-ST workshops and implementation support offered by the FHWA in utilizing HERS-ST effectively. “You have to understand what the output means in order to ‘sell’ the results to others,” Cornelius states.



The Cloudcroft Tunnel.

## WHAT'S NEXT?

New Mexico is looking to expand its use of HERS-ST in a variety of ways.

The planning office sees the DOT utilizing the program to establish impacts to user benefits at certain funding levels, a tool that will become increasingly valuable as dollars for transportation improvements become more limited.

Planning Director Bruce Bender envisions utilizing HERS-ST to analyze issues of particular importance to a rural State like New Mexico, i.e., the rising cost of fuel and how that might affect infrastructure priorities. He says that valuable information could be gleaned from a HERS-ST sensitivity analysis centering on the price of gasoline. Whatever the particulars, New Mexico is pressing toward a major use interface for a consolidated database.

Because FHWA's Office of Asset Management is continuously improving HERS-ST, NMDOT expects that HERS-ST has the potential to be a significant component of its future asset management strategies, particularly as the agency focuses on corridor analysis as part of its long range planning process. Bender says that NMDOT has seen a real return on its investment in HERS-ST and "is committed to integrating it even more."



Picturesque I-25 just south of Santa Fe.

**Additional information is available from the following:**

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