



# Office of Asset Management

ANNUAL REPORT 2001



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



# Office of Asset Management



A N N U A L   R E P O R T   2 0 0 1

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U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION  
OFFICE OF ASSET MANAGEMENT



U.S. Department  
of Transportation  
**Federal Highway  
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## NOTE FROM THE DIRECTOR

### Office of Asset Management, Infrastructure Core Business Unit, Federal Highway Administration

The Federal Highway Administration's Office of Asset Management is pleased to present this *2001 Annual Report*. The Office is charged with providing tools, techniques, and information to support the stewards of the Nation's transportation system as they work to ensure that the traveling public—both today and in the future—will enjoy a transportation system maintained and operated to the highest and most cost-effective standards.

The Office of Asset Management looks at the entire highway system from the owners' and users' points of view, as well as from engineering and economic perspectives. Highway agencies and users desire a highway system that is reliable and efficient. Users of today's system ask whether their tax dollars are being spent wisely on the maintenance and operation of the highway network. They want less congestion, and they want roads that are engineered to be safer, to perform better, and to last longer.

Transportation Asset Management is a strategic approach to managing and investing in transportation infrastructure. It is a business process and a decision-making framework that covers an extended time horizon and considers a broad range of assets. It enables the ongoing monitoring of system performance. The Asset Management approach incorporates the engineering and economic assessments of trade-offs between alternative investment options, both at the project level and at the system level, and presents this information to management to assist in making investment decisions.

This Report describes what we have accomplished and the many projects and initiatives that are currently underway. For example, we have initiated a major effort to develop guidelines and a prototype system for highway and transit tunnel management. We have also organized and conducted several technical conferences, developed software and analytical tools, and produced a variety of informative materials on engineering economic analysis, highway construction, preservation and quality management, financial reporting, and data management and integration. Existing efforts will continue in the coming year, some projects will come to fruition, and new activities will be initiated. We look forward to pursuing these ongoing activities and to future work with our partners throughout the country as we apply Asset Management tools and principles to improve the performance of our Nation's highways.



Madeleine Bloom

Director, Office of Asset Management





**The Office of Asset Management serves as an advocate for Asset Management; for pavement management and analysis; for bridge management and inspection; for construction and preservation activities; for engineering/economic analysis applications; for data integration; and for technology development, outreach, and partnering initiatives.**

## OFFICE OF ASSET MANAGEMENT: ITS MISSION



The mission of the Office of Asset Management is to provide leadership and expertise in the systematic application of management and investment strategies for highway infrastructure assets. The Office has the following key responsibilities:

- Provide national guidance on Asset Management principles for highway system administration.
- Develop a strategic framework, processes, and methods for managing individual assets such as pavements, bridges, tunnels, and other infrastructure.
- Develop practical and innovative resource allocation tools and techniques.
- Provide technical assistance and training on effective information and data management strategies to support comprehensive and integrated infrastructure decision-making.
- Partner with governmental groups at the Federal, State, and local levels, as well as with academia and private industry, to conduct nationwide research, development, and technology programs.

The Office of Asset Management serves as an advocate for Transportation Asset Management; for pavement management and analysis; for bridge management and inspection; for construction and preservation activities; for engineering/economic analysis applications; for data integration; and for technology development, outreach, and partnering initiatives.

# PRINCIPLES OF TRANSPORTATION ASSET MANAGEMENT

The Office of Asset Management was established in 1999. The Office develops, enhances, delivers, and promotes the use of tools and techniques to support the implementation of Transportation Asset Management concepts and principles. These tools and techniques are delivered through technical assistance and training services.

Cooperative arrangements with organizations such as the American Association of State Highway and Transportation Officials (AASHTO), the Transportation Research Board (TRB), and industry associations are a top priority of the Office. “Partnership” is a guiding theme in the work the Office undertakes, and its services are available to all State departments of transportation (DOTs) and other agencies.

## What Is Asset Management?

Transportation Asset Management has been a new term to many. The Office recognized this early on and undertook a major effort to explain what the term means and what the Office does. This effort resulted in the development and publication of the *Asset Management Primer*, a guidebook on the basic concepts and principles of Asset Management.

As stated in the Primer, Asset Management is not a specific product or service, but rather a way of doing business that will apply differently from organization to organization. It is a framework for making decisions in order to use resources efficiently. Assets can take various forms—they can be people, money, information, and physical resources. The Federal Highway Administration (FHWA) is currently focusing on physical assets such as pavements,

structures, tunnels, and hardware. Over time, this focus will be expanded to include the full range of transportation assets.

The Asset Management framework in broad terms consists of these elements:

- The establishment of performance expectations, consistent with goals, available budgets, and organizational policies. These expectations guide the analytical and decision-making processes.
- The collection of inventory and performance information to determine future system requirements.
- The use of analytical tools and reproducible procedures to provide cost-effective strategies for allocating budgets to satisfy agency needs and customer requirements.
- The presentation of alternative investment options, which are evaluated consistent with long-range plans, policies, and goals. Projects are prioritized and selected, and programs are implemented.
- The periodic reevaluation of the entire process through performance monitoring.

## Why Asset Management?

State and local transportation agencies entered this century facing a series of new and different challenges. The responsibilities of these agencies have shifted in focus from major highway construction projects, primarily the designing and building of the Interstate Highway System, to maintaining and preserving the existing system. This shift presents a complex range of challenges as user expectations for the system continue to increase and demand continues to grow. Highways are more congested than ever in many parts of the country. Increasing demand and normal





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wear and tear subject the system to ongoing deterioration.

Layered on top of these challenges is the impact of reductions in staff that are occurring at the Federal and State levels as a result of government downsizing initiatives and the general aging of our highway workforce. A robust economy during the last decade also made it difficult for transportation agencies to compete for and retain capable personnel. As transportation agencies lose experienced staff, they are finding that it makes sense to use more systematic approaches that capture corporate memory and expertise and aid in the decision-making process.

Additionally, in States throughout the country, transportation budgets are competing with other budget demands. And legislative initiatives are directing transportation funds to activities outside traditional transportation projects.

Despite these changes, the public still expects governmental agencies to preserve and protect the transportation system they rely on. Public expectations have in fact risen. Today, transportation agencies are expected to communicate and explain their management approaches and results to elected officials and the general public. In addition, they must be fully accountable.

Clearly, a new way of doing business is required to respond effectively to this mix of strong, competing demands. The major shift that is occurring as we start the new century requires and demands a more systematic and thorough process. State DOTs and other transportation agencies are moving from constructing new assets to using Asset Management principles in their business practices to better manage the entire infrastructure.

### What Are the Key Elements of Asset Management?

For an Asset Management approach to be applied effectively to a transportation system, the following elements are essential:

**There Must Be a Decision-Making Framework.** Asset Management establishes a logical decision-making framework that incorporates principles from the disciplines of engineering, economics, and business. Results reflect a systematic, organized, logical, and reproducible approach.

**The Approach Must Be Analytically Based.** Engineering, economic, performance, and behavioral models and associated data inputs provide the means to identify optimal investment strategies.

**There Must Be Effective Communication.** The organization must have an effective means for transmitting the information required by stakeholders—ranging from legislators to front-line practitioners. Information must also flow horizontally within the organization, across functions, asset classes, and modes.

**The Work Must Be Goal Driven.** Asset Management focuses on customer expectations along with the organizational structures, practices, policies, and budgets unique to each agency and legislative environment. Performance goals provide a way for transportation agencies to respond to the public's interest in how well their assets are being managed.

**Alternatives Must Be Weighed.** Asset Management gives an agency the ability to perform "What if?" analysis. The ability to weigh and articulate the agency and user impacts of choosing one alternative over another is vitally important.

**Fact-Based Dialogue Is Essential.** Asset Management provides for fact-based dialogue among all interested parties. Relevant, objective, and credible information is available to all parties in the decision-making process.

## OFFICE OF ASSET MANAGEMENT: INITIATIVES 2000–2001

**T**hree teams make up the Office of Asset Management: (1) System Management and Monitoring, (2) Construction and System Preservation, and (3) Evaluation and Economic Investment. During the past year, these teams took on a variety of research, development, training, technology deployment, technical support, and outreach initiatives, many of which were identified in last year's annual report. Ongoing and new initiatives represent a wide range of topics that are central to advancing Asset Management. Details of individual projects and initiatives undertaken by each team are given below.

### System Management and Monitoring

The **System Management and Monitoring Team** continues to develop and promote systematic approaches to management of highway assets as reflected in the following activities:

- Initiated a contract to develop a first-generation guide and management system for highway and transit tunnels in cooperation with the Federal Transit Administration and the FHWA Office of Bridge Technology. The project is currently underway and involves two phases. The first phase will establish an inventory of highway and transit tunnels in the United States. The second phase will develop detailed guidance for inspecting and rating the condition of tunnel components, establish preservation and rehabilitation strategies, develop a prototype database system, and establish procedures for integrating tunnel management systems with bridge management systems and Asset Management.
- Initiated a contract that will demonstrate and document how a State can use its pavement management system to monitor the real-life performance of its pavement network. The project is designed to track the performance of any critical pavement parameter. In this project, Superpave is being used as an example. The project is also intended to demonstrate the importance and necessity of electronically linking all pavement databases such as pavement management, materials, construction history, and quality assurance/quality control. In the future, case studies will be conducted in States to show how the tracking information can also be used to evaluate pavement projects that have warranty clauses.
- Participated in the design, development, and testing of PONTIS 4.0. This new version of the bridge management software is now available and is being deployed to States and other agencies. A new National Highway Institute (NHI) training course has been developed and is available for this software.



- Developed implementation strategies for the new AASHTO Provisional Standards for Pavement Data Collection to measure pavement roughness, rutting, cracking and faulting.
- Completed a study in seven States where pavement management systems have been used to track the performance and pavement life extension resulting from scheduled preventive maintenance activities such as crack sealing, surface sealing, and similar treatments. A report is being prepared.
- Completed a survey and report of all States regarding their pavement management practices and methods for data collection and analysis. The survey and report formed the baseline for pavement management activities for the team, as well as a summary of best practices.
- Continued to develop the Pavement Management Software and Equipment Catalog. This Catalog is an updated version of the very popular Software Catalog that was published in 1997. The new Catalog is expected to be complete and ready for distribution in February 2002.
- Continued partnership with AASHTO to investigate the feasibility of developing a management system for roadway hardware including guardrails, signs, crash cushions, signals, and similar items on and adjacent to highways.
- Nearly completed the development of a new NHI training course on "Engineering Applications for Pavement Management Systems." This new course is designed to demonstrate best practices and techniques used by State practitioners to derive real-life pavement performance information from existing pavement management system databases.
- Developed a Web site called "Communities of Practice for Asset Management" in partnership with AASHTO. This interactive Web site, currently running off the FHWA server, consists of eight group areas focused on specific aspects of Asset Management. The group areas are managed and supervised by facilitators, including staff from the Office of Asset Management.
- Initiated a contract to develop a new NHI course on Transportation Asset Management. This new course will be a companion to the new AASHTO Guide to Transportation Asset Management.

### Construction and System Preservation

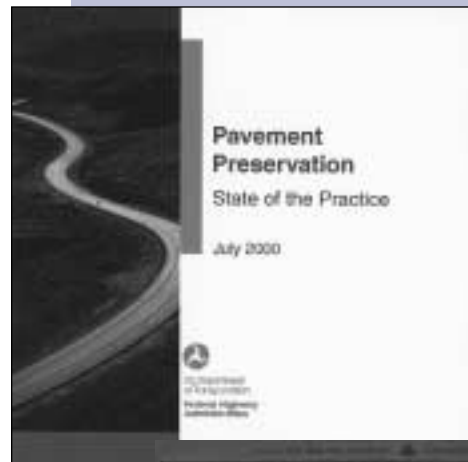
The **Construction and System Preservation Team** has been developing analysis, evaluation, and monitoring tools as well as providing States with technical support, guidance, and training to reduce the deterioration and improve the overall quality and performance of the highway system. Following are some of the noteworthy accomplishments of this team:

- Coordinated with the National Partnership for Highway Quality in its efforts to identify and promote concepts, activities, and technologies that have the potential for improving the quality of planning, design, construction, and maintenance of the Nation's highways. These include a variety of Continuous Quality Improvement concepts and techniques.





- Developed and made available an NHI Training Course called “Use of Critical Path Methods for Estimating Scheduling and Timely Completion.” Unlike its predecessors, this course is geared towards early project completion and addressing motorists’ concerns about the prolonged existence of work zones.
- Provided support to AASHTO in the development and propagation of the SiteManager Construction Management System. Through its computerized database format, SiteManager offers State DOTs many potential benefits in managing construction projects.
- Provided leadership and technical support to the Transportation Curriculum Coordination Council (TCCC), which consists of representatives from various regional technician training and certification groups, the private sector, FHWA, and NHI. Through the TCCC the team responds to the training and certification needs of State DOTs and industry in the areas of highway construction, inspection, and materials testing and certification.
- Continued development and marketing of improved pavement smoothness measurement and analysis, working through the Pavement Smoothness Expert Task Group and in cooperation with the FHWA Office of Pavement Technology. Initiated development of training materials for project personnel and for engineers working with profile technology.
- Continued to develop pavement preservation programs through publication and distribution of state-of-the-practice CD-ROMs, videotapes, and other materials on pavement preservation techniques to all State DOTs.
- Developed and made available two NHI training courses on pavement preservation techniques: “Pavement Preservation: The Preventive Maintenance Concept” and “Pavement Preservation: Selecting Pavements for Preventive Maintenance.”





- Developed and completed an agency-wide, national Customer Satisfaction Survey for measuring and tracking the public's perception of and satisfaction with the Nation's highway system.
- Participated in pooled-fund studies and provided technical support on the safety and mobility of the highway system during construction and maintenance, including control of hazardous wastes and application of innovative technologies for work zone traffic control and safety; accelerated construction; and use of new materials, practices, and methods.
- Participated in and provided support to various AASHTO Committees/Subcommittees, including coordinating and conducting technical conferences, committee meetings, and workshops.

### Evaluation and Economic Investment

The **Evaluation and Economic Investment Team** develops, recommends, and advances engineering economic analysis and evaluation tools, data integration and management approaches, and other asset management techniques for use by State DOTs. These tools and techniques, which can be applied at multiple levels of the transportation system or to specific projects, allow objective and informed decisions to be made on the transportation assets. The team has been involved in the following activities:

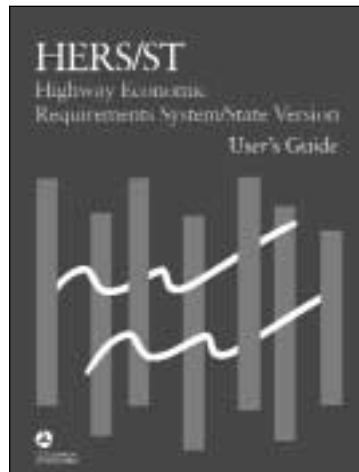
- Published the *GASB 34 Primer*, which details the Governmental Accounting Standards Board's *Statement 34, Basic Financial Statements—and Management's Discus-*

*sion and Analysis—for State and Local Governments*. GASB 34 calls for State, local, and municipal governments to report the original cost of infrastructure constructed or improved since 1980 and, for each reporting year, the cost of using the assets. GASB 34 will have an enormous impact on how transportation investment decisions are determined and implemented. For this reason, GASB 34 provides great motivation for transportation agencies to adopt Transportation Asset Management concepts and principles.

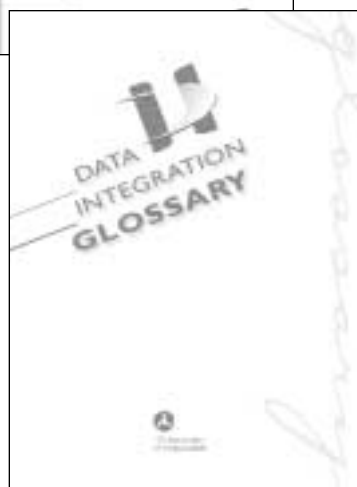
- Conducted a peer-exchange workshop in cooperation with the AASHTO Task Force on GASB 34. The meeting provided participants with an understanding of the new standard and an opportunity to share information and ideas with individuals from other agencies on how they intend to respond to the GASB reporting requirements. Speakers were invited to talk about various perspectives of GASB 34.
- Continued to develop and refine the Life-Cycle Cost Analysis (LCCA) instructional software designed to support the evaluation of alternative pavement design decisions on the basis of agency and user life-cycle costs. The model will account for uncertainty in costs and performance, and provide outputs for the use of risk analysis in decision-making. Teaching materials are also being developed. The software will be initially distributed to State DOT officials via courses offered by the FHWA Resource Centers.
- Developed a prototype version and conducted a pilot evaluation of the Highway Economic Requirements System/State Level (HERS/ST). HERS/ST evaluates the impacts of alternative program structures on highway condition, performance, and user cost levels.



It uses incremental benefit-cost analysis in simulating investment decisions. The team conducted a HERS/ST workshop where participants from State DOTs and other agencies had the opportunity to learn about the uses and mechanics of the model, to assess the appropriateness of the model in State resource allocation decision-making, and to make suggestions for improvements.



- Initiated development of HERS/ST Version 1.0. The software, with training, will be distributed to State officials in FY 2002. The new software is based on the prototype but will be significantly more user-friendly and will accept a broader array of State-supplied data.
- Published the *Data Integration Primer* and the *Data Integration Glossary* for Asset Management data integration in State DOTs. These documents contain information and ideas on the principles and benefits of data integration, alternative approaches and strategies, experiences from agencies that have integrated their databases, application of tools and technologies, and common problems or barriers encountered and ways to overcome them. The team is also developing more detailed case studies of data integration experiences in State DOTs.
- Organized jointly with the AASHTO Task Force on Asset Management a Data Integration Forum and Peer Exchange intended for information management practitioners in



transportation agencies. The forum, scheduled for December 2001, will provide participants an overview of the state of the practice in data integration, as well as an opportunity to share their experiences and concerns in this area.

- Initiated the development of an executive-level Engineering Economic Analysis course for transportation managers. The course will be offered to FHWA field executives in FY 2002.
- Participated in various activities of the AASHTO Task Force on Transportation Asset Management, TRB Task Force on Asset Management, and the National Cooperative Highway Research Program (NCHRP) by providing technical inputs and reviews on ongoing and proposed research projects, developing research topics, reviewing publications, and organizing meetings and conferences.

The many initiatives described above underscore the progress FHWA's Office of Asset Management made during the past year in providing products, information, tools, training, and technical support. These products and programs are valuable to State DOTs as well as our other transportation partners. As emphasized in our *2000 Annual Report* and repeated here, "partnership" is the underlying theme of our activities and accomplishments.

## OFFICE OF ASSET MANAGEMENT: PARTNERSHIP ACTIVITIES

As indicated in our office's individual team initiatives, we have established and continued to strengthen key partnerships with many organizations including AASHTO, TRB, the National Partnership for Highway Quality, the Foundation for Pavement Preservation, and other industry associations.

The Office is actively involved with the TRB Task Force on Asset Management, which sponsored four sessions on Asset Management at the January 2001 TRB Annual Meeting and held two meetings to develop a research agenda for future TRB and Asset Management efforts. The Task Force recommended establishing a permanent TRB Committee on Transportation Asset Management to take part in activities in the following areas:

1. Defining Asset Management and its benefits,
2. Technical aspects of Asset Management,
3. Sustaining Asset Management and demonstrating effectiveness,
4. Coordination with other organizations.

The Task Force plans to produce a document describing the state of the practice in Asset Management.

The Office continues to work jointly with several AASHTO committees. With the AASHTO Task Force on Transportation Asset Management we have been providing technical support in the development of the Asset Management Guide through an NCHRP project. Other NCHRP research projects related to Asset Management will be underway soon. The Office also works closely with the AASHTO Committees/Subcommittees on Highways, Bridges and Structures, Maintenance, and Transportation Finance.

The Office participates with the Asset Management subgroup of the National Research and Technology (R&T) Partnership Forum, which was established by FHWA, AASHTO, and TRB to coordinate research and technology activities. In FY 2001, the Office contributed to the Forum by identifying major research theme areas, reviewing existing R&T programs related to Transportation Asset Management, comparing current activities to future requirements to determine gaps and duplications of effort, prioritizing research gaps and identifying high priority areas, and establishing opportunities for partnering on current and future research.



**For further information on FHWA Asset Management initiatives, contact:**

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