ASSET MANAGEMENT

◆

Advancing
the
State of the Art
Into the
21st Century
Through
Public-Private
Dialogue

◆

Federal Highway Administration
and the
American Association of
State Highway and
Transportation Officials

FOREWORD

In September 1996, the Federal Highway Administration and the American Association of State Highway and Transportation Officials jointly sponsored an Executive Seminar on Asset Management in Washington, D.C. A total of 65 participants from 23 States attended. These participants represented leaders in asset management whose businesses share many common asset management concerns with the highway community. Drawn from private industry, utilities, State departments of transportation, the Federal Highway Administration, quasi-government organizations, and the research and supplier communities, these representatives met for two half-days to share their experience and expertise to improve the quality of asset management.
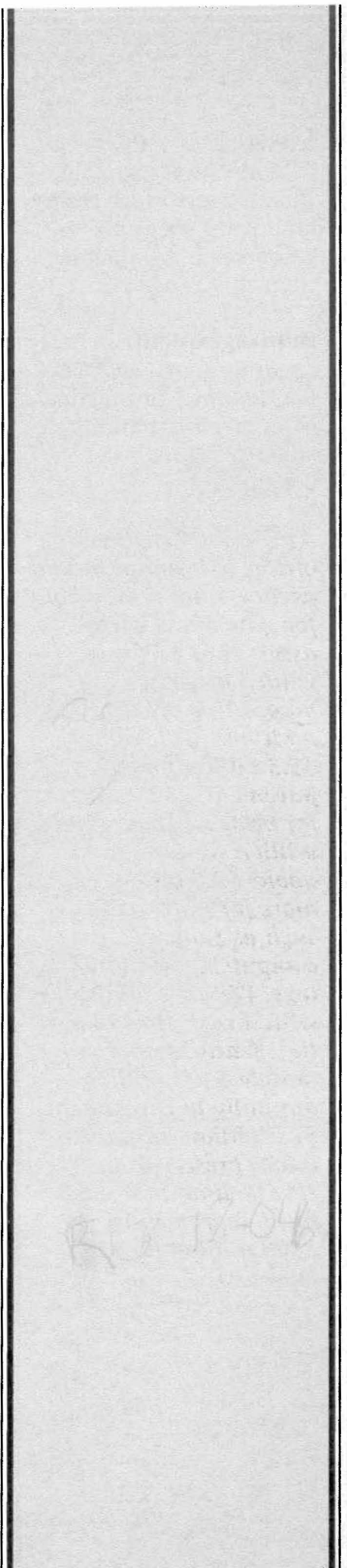
Transportation agencies have been working for nearly two decades to develop and implement pavement and bridge management systems. At the same time, other government agencies and private-sector companies that provide, manage, maintain, rehabilitate, and operate physical infrastructure are facing some of the same issues as the highway community. These issues relate to maintaining operable and efficient facilities under increasing fiscal constraints.

Asset management transcends public/private-sector distinctions because the basic goals, components, and methodologies are the same. Yet, although entities in the public and private sectors share similar objectives and concerns regarding the management of their infrastructure, they rarely interact and share experiences on these issues. This seminar was a first step toward encouraging and fostering the interaction needed for the different sectors to help each other advance the state of the art of asset management. This paper reflects the information shared at this seminar.

CONTENTS

As the chief engineering officer of a major public agency, I am responsible for a business with assets that might be valued by some accounting practices at a bit over $11 billion– $5.5 billion for pavements, $2.2 billion for bridges, about $400 million for land, and about $2.8 billion or more for other assets such as vehicles, computers, and buildings. We have a business with a cash flow budget that features approximately $400 million annually in investment, $75 million in maintenance preservation efforts, and an overall total approaching $600 million for all purposes.

INTRODUCTION

Businesses talk about assets all the time. Their assets include, along with human resources and goodwill, the physical things they own–their real estate, physical plant, inventory, investments–to make their business run.

The United States has nearly 6.3 million kilometers of streets, roads, and highways and more than 550,000 bridges. These roads and bridges–which represent a Federal, State, and local government investment of more than $1 trillion–make the country run. They are, in fact, the Nation's largest government-owned asset.

Businesses, to stay competitive, must manage their assets efficiently, effectively, comprehensibly, and comprehensively. To do so, savvy industry leaders develop tailored asset management systems that let them monitor and assess the status and condition of their assets individually and collectively. These systems give them the information and tools they need in order to decide how to maintain their assets–and thereby retain or regain their competitiveness.

Like businesses, the public agencies responsible for the country's transportation infrastructure have to maintain, replace, and/or preserve their assets. They have to make the best use of limited resources. And they have to ensure accountability to their "stockholders"–the American public.

These agencies are no stranger to the concept of asset management. In fact, they've been using tools such as sufficiency ratings and computerized bridge and pavement management systems for years. But today, as public agencies try to meet ever-increasing commercial and personal travel demands with ever-dwindling resources, efficient resource allocation and infrastructure management are more critical than ever before.

This paper makes the case that systemic asset management is today's best approach for balancing growing demands, an aging infrastructure, and constrained resources. Simply put, it is "good business." Informed managers in the public, private, and quasi-governmental sectors agree and herein share their ideas and expertise.

What Is Asset Management?

Our decisions are sound, reasonable, and appropriate when they are based on solid facts. All too often, however, decisionmaking about resource allocation is based on anecdotal information and intuitive judgments. Asset management is a systematic process of maintaining, upgrading, and operating physical assets cost-effectively. It combines engineering principles with sound business practices and economic theory, and it provides tools to facilitate a more organized, logical approach to decision-making. Thus, asset management provides a framework for handling both short- and long-range planning.

Goals of asset management

An asset management system lets decisionmakers have ready access to quantitative and qualitative data on an organization's resources and the facility's current and future performance. It facilitates decisionmaking based on these data and on relevant "rules of thumb" and principles drawn from engineering, economics, accounting, risk manage-ment, and customer service to ensure efficient resource allocation and asset optimization.

Asset management aims to:
* Enhance decisionmakers' knowledge both of inventory and of asset value.

* Instill a sense of ownership regarding assets at the operator/plant manager level.

* Recognize data information as a "corporate asset."

* Lend credibility to and improve decisionmaking.

* Encourage decisionmakers and managers to "think globally, but act locally."

* Provide opportunities to reevaluate standards.

* Encourage implementation of a strategic perspective that:
    * replaces turf battles with teamwork,
    * includes training and communications,
    * ties resource allocations to savings from replacement,
    * recognizes people as assets,
    * includes system user needs,

- recognizes the role of rules of thumb,
- integrates asset management with asset development, and
- establishes standard processes and protocols.

* Recognize life-cycle costs, including user costs and benefits.

Attributes of an asset management system

An asset management system reflects the particular "vision" and "culture" of the host organization, be that a public- or private-sector entity. Regardless of the specific attributes of a given organization, an asset management system:

* Establishes a common understanding of performance measures and criteria.

* Provides understandable results in a user-friendly environment.

* Is customer-focused.

* Is mission-driven.

* Is accessible at many levels within the organization.

* Is flexible.

* Is linked to technical analysis, decisionmaking, and budgetary processes.

* Facilitates the education of users and decisionmakers.

A comprehensive asset management system addresses a broad range of components, procedures, and outputs. Thus, an asset management system should:

* Include both inventory information and condition measures.

* Include a performance prediction capability.

* Integrate databases to ensure data integrity and enhance data accessibility and compatibility.

* Use life-cycle cost analysis with all its components.

- Enable divestiture of outdated systems and unproductive assets.

- Consider system optimization versus project optimization.

- Output useful information on a periodic basis, ideally in real time.

- Facilitate an iterative process that is performed on a regular basis.

Why Is It Useful?

Asset management offers significant benefits, including the ability to optimize network- or system-level improvements and investment strategies in addition to analyzing individual projects. Asset management lets decisionmakers readily assess tradeoffs among various policies, components, and methods and use a common yardstick for judging projects.

Benefits to owners/operators

The benefits of an asset management system for public- and private-sector owners and operators are in two general categories: (1) the system facilitates better information and decisions, and (2) it increases productivity.

Asset management systems:

- Improve program quality.

- Improve information and access to information.

- Help decisionmakers identify and focus on key issues.

- Facilitate economic assessment of tradeoffs.

- Provide improved documentation of decisions.

- Facilitate communication.

- Provide improved information on return on investment and understand the value of investments.

- Improve the cost-effectiveness of investment strategies.

- Reduce both short- and long-term costs.

* Streamline the decisionmaking process.

Benefits to customers

Ultimately, an asset management system benefits the customer or end-user by providing:

* Improved convenience.

* Improved service (e.g., comfort, reliability, safety, in a transportation context).

* Savings passed on from the owner/operator to the customer.

* More accessible facilities and services due to more efficient operation (and, in a transportation context, less construction and maintenance disruption).

WHO'S USING IT?

Asset management is used in the private sector, the public sector, and the quasi-governmental sector. It's known and used in the United States and throughout the world–in Europe, Asia, South America, and elsewhere.

* Retailing giant Wal-Mart uses asset management to maintain and manage $15 billion in real estate assets. When the company evaluates a potential market, the system is used to determine whether it is more feasible to buy or lease.

* Since its deregulation, the electric power industry has had to focus on profitable operation. The industry must thus ensure value in its spending. Asset management decisions are made by asking "How do we maximize the value of our assets over their life cycle?"

* The U.S. Air Force has begun using a tiered system to identify and prioritize all base asset maintenance and repair requirements. This includes requirements for facilities as well as for the supporting infrastructure.

* The Virginia Department of Transportation used asset management to arrive at the decision to shut down a highway for 17 days rather than tolerate a detour for 2 1/2 years. This decision ran counter to accepted wisdom, which is "no highway shutdowns," but

ultimately saved the traveling public time, money, and aggravation.

Why is its use so widespread? Probably because asset management is a flexible and reliable mechanism that can be adapted to a wide variety of applications. The remainder of this section presents some broad benchmarks, conclusions, and comparisons about the asset management systems now being used in various sectors.

Private sector

Private-sector asset management systems vary in complexity and sophistication depending on the nature of the business, need for data, layout and breakdown of the network, and role of the customer. Those represented at the seminar:

* Have near-state-of-the-art asset management systems.

* Are streamlined to the maximum extent possible and are highly cost-effective.

* Are very responsive to top management, user, and customer needs.

Public sector

* Those State departments of transportation that have state-of-the-art pavement and bridge management systems are technologically and managerially comparable with the leaders in private industry.

* In some instances, State data needs and investment analysis are more complex–and robust–because of the sheer size and diverse nature of the assets involved.

* The private sector seems to be generally further along with financial and risk analysis than some State pavement and bridge management systems.

* Progress in the use of high-speed, automated, condition-survey data-collection equipment has allowed many State departments of transportation to keep pace with–and, in certain instances, pull ahead of–some private companies that do not have as strong a need for such sophisticated data collection.

* Data uniformity–an imperative within private companies–is more problematic in the public sector. In the pavements area, States have uniform data within their own organizations but not across States.

With asset management systems, we will make better investment and resource allocation decisions, including disinvestment decisions. We will more clearly identify that we are in the business of providing consumer goods and services, not in building monuments.

Quasi-governmental sector

Quasi-governmental entities are using as much state-of-the-art technology as are private-sector and State organizations. However, it is more difficult to benchmark status in this sector since each entity is unique. Moreover, these entities–which are simultaneously both corporate and political organizations–are each affected by different factors and pursue different options for different reasons.

HOW IS IT BEING DONE?

There are as many ways to implement asset management systems as there are types of entities and organizations using asset management. There are, however, some basic conditions and constraints that affect asset management in the various sectors. For example, in the private sector, there is a more direct link between asset management and profits; this link is much more obscure in the public sector. Also, the private sector is generally able to divest itself of unprofitable assets; the public sector usually has no such option.

The two following mini-profiles further indicate some sectorial differences in asset management system design and implementation.

Asset management in the telecommunications industry: GTE

Deregulation of the telecommunications industry means that asset management systems are shifting their focus from meeting regulatory requirements to meeting the needs of customers. In the telecommunications industry, asset management takes on the following basic functions:

* Network management and inventory, including what, where, use, and condition.

* Provisioning–that is, providing and configuring equipment to provide services.

* Planning and engineering, including growth and replacement.

* Financial recordkeeping.

Asset management in the Port Authority of New York and New Jersey

The Port Authority of New York and New Jersey has an annual budget of approximately $2.6 billion, a quarter of which is devoted to capital expenditures. Like many agencies and organizations, the Port Authority is subject to fiscal constraints due to changes in State and local governments and the business sector. Nonetheless, the organization has been generally successful in its efforts; this is primarily due to an emphasis on reinvesting revenues in facilities. Each major entity of the Port Authority manages its assets independently.

Several challenges directly related to asset management face the Port Authority. These include an increased emphasis on cost control; continued trends to divest, outsource, and privatize; increased emphasis on delivering immediately visible improvements in customer service; increased antipathy to long-term planning; and increased expectations on the part of elected officials and political appointees that financial, business, political, and environmental conflicts will be resolved. The structured decisionmaking process offered by an asset management system will result in better service for users, more business opportunities, and a streamlined agency.

Formula for success

Several ingredients contribute to the success of an asset management system:

- Tie the functions of asset management to the vision and mission of the particular organization.

- Promote sustained political commitment.

- Set explicit goals for asset performance.

- Acquire, train, and retain highly skilled personnel to manage and use the system.

- Transform data into useful information.

- Facilitate information-sharing between organizations.

- Focus on the customer–even if the organization in question is a monopoly (e.g., a State transportation department); asset management is most efficient and effective when it takes into account customer/user needs.

Private-Sector Successes

Successful private-sector asset management systems are used to justify decisions, communicate needs, and compute return on investment. Some specific uses include:

* Examining corporate real estate holdings on a 7-year cycle and making a decision to remodel or move out.

* Evaluating the value of assets in terms of life-cycle costs and benefits.

* Developing techniques to address risk and uncertainty.

* Linking profitability directly to customer satisfaction.

* Linking asset management explicitly to the corporate vision.

Public-Sector Successes

The public sector has had reasonable success in preserving the physical condition of pavements, bridges, etc., given financial constraints. Specific transportation department successes include:

* Using the pavement and bridge management systems to monitor performance–including team success, performance success, and customer satisfaction.

* Using asset management tools and integrated management systems to improve management in the face of personnel reductions.

* Looking at user costs in integrated asset management.

* Promoting the asset management concept with State, county, and local officials–which means increased dollars for highways, streets, and roads.

* Changing the way agencies do business, such as letting maintenance and rehabilitation contracts on a corridor basis to minimize repeated disruptions, permitting districts to set priorities for extension of useful life of good and fair roads, and using the concept of remaining service life to justify long-range planning and programming.

* Demonstrating the changes in physical and operating characteristics of the highway and bridge systems over time.

* Relating changes in condition to available resources and highlighting the future system performance impacts of different budget and program scenarios.

Hurdles to overcome

There are several challenges to be taken into account in implementing a comprehensive asset management system. These include the ability–or inability–to predict and price incremental improvements, provide staff capacity and skills, and the need to sustain public and legislative support.

This need to build support–a hurdle encountered in both the public and private sectors–stems from the fact that it's difficult to "sell" system preservation and preventive maintenance needs. The linkage between maintenance and profit and customer satisfaction must be clearly and convincingly demonstrated to those who hold the purse strings.

It is the private sector's observation that the challenge to sustain long-term support is more acute in the public sector, where the vision of elected officials and political appointees is more oriented toward short-term issues than to long-range needs and budget requirements. That is, the planning horizon only extends to the next election, or generally only 2 years ahead.

Other hurdles to overcome in implementing an asset management system can be classified under the headings of design and implementation.

Design Hurdles

Several issues arise in terms of the design of asset management systems, including the following:

* Asset management systems are initially costly to design and develop.

* The functionality of asset management systems must satisfy the needs of many different users.

* Asset management systems must be flexible and able to adapt to rapid changes in technology.

* The outputs of an asset management system must quantify the impacts of decisions in understandable language.

- Asset management systems should include a relational and geographic information system to manipulate and display both tabular and spatial data.

- The data requirements for asset management systems involve a variety of data issues, including:
    - data availability and quality;
    - the ability to include nonquantitative information, for example, existing rules of thumb;
    - the tendency to collect too much data;
    - the need to integrate data from various sources and have a corporatewide database; and
    - the need to standardize data collection to improve communication and reduce costs.

Implementation Hurdles

Once an asset management system has been designed and developed, various issues–such as the following–arise related to the system's implementation and use:

- It is often difficult to establish a realistic time frame for system implementation, in part because of the high expectations held by many end-users and managers.

- Organizational culture may resist asset management because of turf battles; a preference for–or, at least, a history of–making decisions in the absence of information; and apparent risk avoidance.

- If asset management is not properly integrated with other agency systems, it may result in duplicative decision-making and errors and may underscore an overall lack of coordination and confidence within an organization.

- Resource commitments are essential. Given the costs and operating skills needed to keep up with applicable advancements in computers and software, adequate resources may not be made available. A sinking fund for equipment, software, and training may help resolve this problem.

- In large organizations with many diverse functions, program coordination and continuity are challenges.

WHAT DOES THE FUTURE HOLD?

Ideally, in the future, transportation agencies will make full use of asset management in both their short- and long-term decisionmaking in the planning, budgeting, and operating functions. To do so, they will need:

- An inventory, condition assessment, and an asset evaluation.

- Performance prediction measures and trend indicators.

- Cost estimates of asset management options and of the resulting impacts.

- Engineering/economic optimization tools.

To implement and operate these asset management systems of the future, transportation agencies must:

- Have skilled and trained personnel to design and operate the asset management systems.

- Begin by challenging their engineering managers to also become economic managers.

- Begin to share what they are doing with the public and to identify what investment "triggers" the public would like to see—what service levels and commitments.

- Convey to the public how they will manage the assets with which they have been entrusted.

- Optimize their decisions and programs based on the different goals set by the public. This means determining. the value users place on long-term performance, comfort, and convenience and determining users' priorities and standards.

They must look at the full costing of transportation work—land, access, mobility, materials, and labor. Competing strategies must be identified, costed, and valued by the benefits they can produce. More emphasis must be placed on core business functions, improvements, and financial investment strategies. Tradeoffs must be dealt with; they need to look at the maintenance costs alongside the initial construction costs, the user costs, and even the community costs—that is, the cost of doing their work versus the cost of not doing their work.

There are all sorts of data available, and somehow we need to take that data and convert it to information. That information will let us make asset management decisions that will then become part of our system development and maintenance plan. Someday, asset management data will be as accessible and usable as what we use in computer-aided design projects. That's the challenge.

Areas that need improvement

To achieve this vision of the future:

* Better strategic investment analysis is needed.

* Asset management systems should be used as a credible means to support resource allocation for projects.

* More attention must be devoted to:
    * condition assessment and performance prediction,
    * risk management,
    * feedback processes (that is, mechanisms for evaluating past decisions and improving the asset management system based on this evaluation),
    * flexibility, and
    * keeping pace with technology.

* Legislators and political appointees must be educated regarding the importance of long-term time horizons, tying asset management to planning, and making the case locally for effective asset management.

* Asset managers will have to be multidimensional–that is, be well-trained and well-versed in financial and investment analysis and risk management.

Future trends

Future trends in asset management–with a particular emphasis on the transportation industry–include the following:

* Stimulating a "thinking" organization–that is, one that thinks about how best to use its assets.

* Providing a strategic perspective that includes making short-term decisions in context and recognizing economies of scale and competition.

* Drawing on a broad base of skills, including business and economics.

* Including better economic analysis instead of relying exclusively on old engineering practices.

* Focusing more on performance and return on investment.

14

* Broadening the definition of products and markets to include all the things that can be done with assets and their leveraging for greater return–e.g., mixed use at sites and focusing on important, previously overlooked assets such as right-of-way.

* Providing a systems perspective and better integration within the organization.

* Using asset management to broaden perspective on approaches for dealing with problems, including technology, partnerships, and mutual agreements.

* Using distance learning for training.

* Outsourcing to industries that can provide cost-effective, asset management services to your organization.

* Moving toward flatter and faster decisionmaking.

* Providing better education of the general public and better tools and methods for communicating with legislators.

* Practicing risk management rather than risk avoidance.

Next steps

The dialogue on asset management that was initiated between the public and private sectors through the Executive Seminar on Asset Management is an excellent beginning. For the first time, practitioners of asset management in a wide range of applications were able to come together to share their experiences, expertise, problems, and solutions. The momentum generated by this exchange can be continued and increased through several "next steps":

* The public and private sectors need to continue this newly formed alliance and extend the dialogue to cover other important topics in asset management.

* The American Association of State Highway and Transportation Officials (AASHTO) needs to define "asset management" and how it relates to the States' missions.

* The Federal Highway Administration needs to share information on asset management with all transportation modes. It also needs to provide technical assistance and help facilitate activities in asset management.
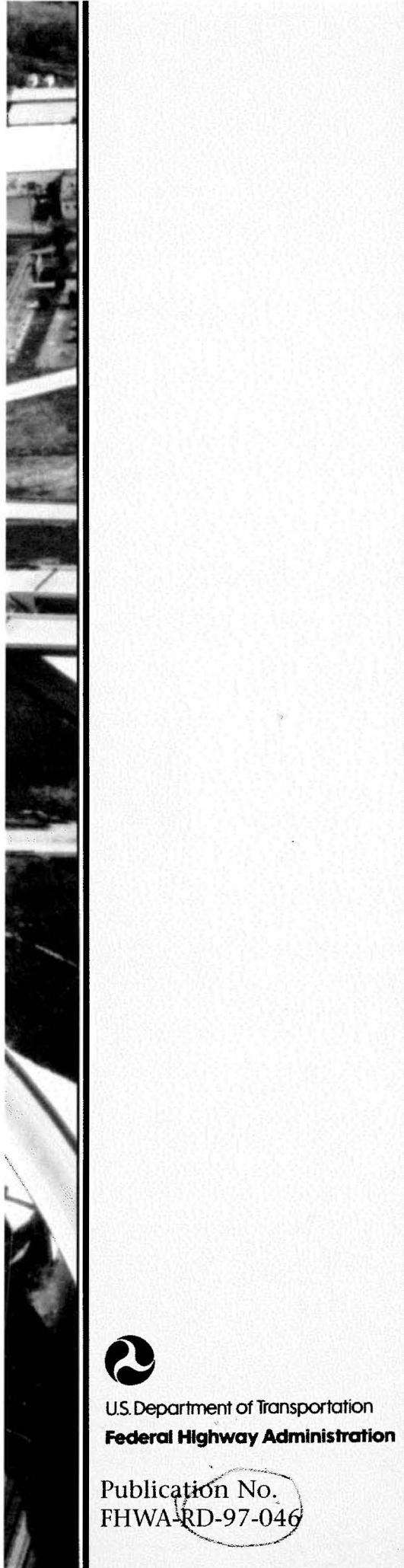
The next steps to advance asset management into the 21st century, given the scale and complexities that are involved, can best be achieved through diligence and patience rather than expecting quick and easy results.

Acknowledgments

U.S. Department of Transportation

Federal Highway Administration

Publication No.
FHWA-RD-97-046