

# EXECUTIVE BRIEF

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# Advancing a Transportation Asset Management Approach



U.S. Department  
of Transportation

**Federal Highway  
Administration**



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## Note from the Director

Transportation Asset Management (TAM) has now become a way of doing business in state transportation agencies. Several agencies have successfully used TAM to address demands to operate sustainably, be transparent and demonstrate accountability.

With aging infrastructure demands and declining purchasing power, transportation agencies are using TAM to balance business needs with engineering judgements and make data-driven trade-offs decisions. TAM is increasingly becoming the framework for agencies to make long-term strategic decisions to effectively manage transportation infrastructure assets and address public concerns about infrastructure health.

This report highlights the essentials of asset management and is a brief intended for transportation agency executives who want to better understand how organizational change can be effected by utilizing TAM principles. This report describes principles that can help transportation agencies look at their competencies, address gaps and implement a framework to be strategic and address mission-critical transportation needs. It also includes experiences of peer agencies that have used TAM to address current and future transportation challenges and produce performance metrics to demonstrate successful results with available resources.



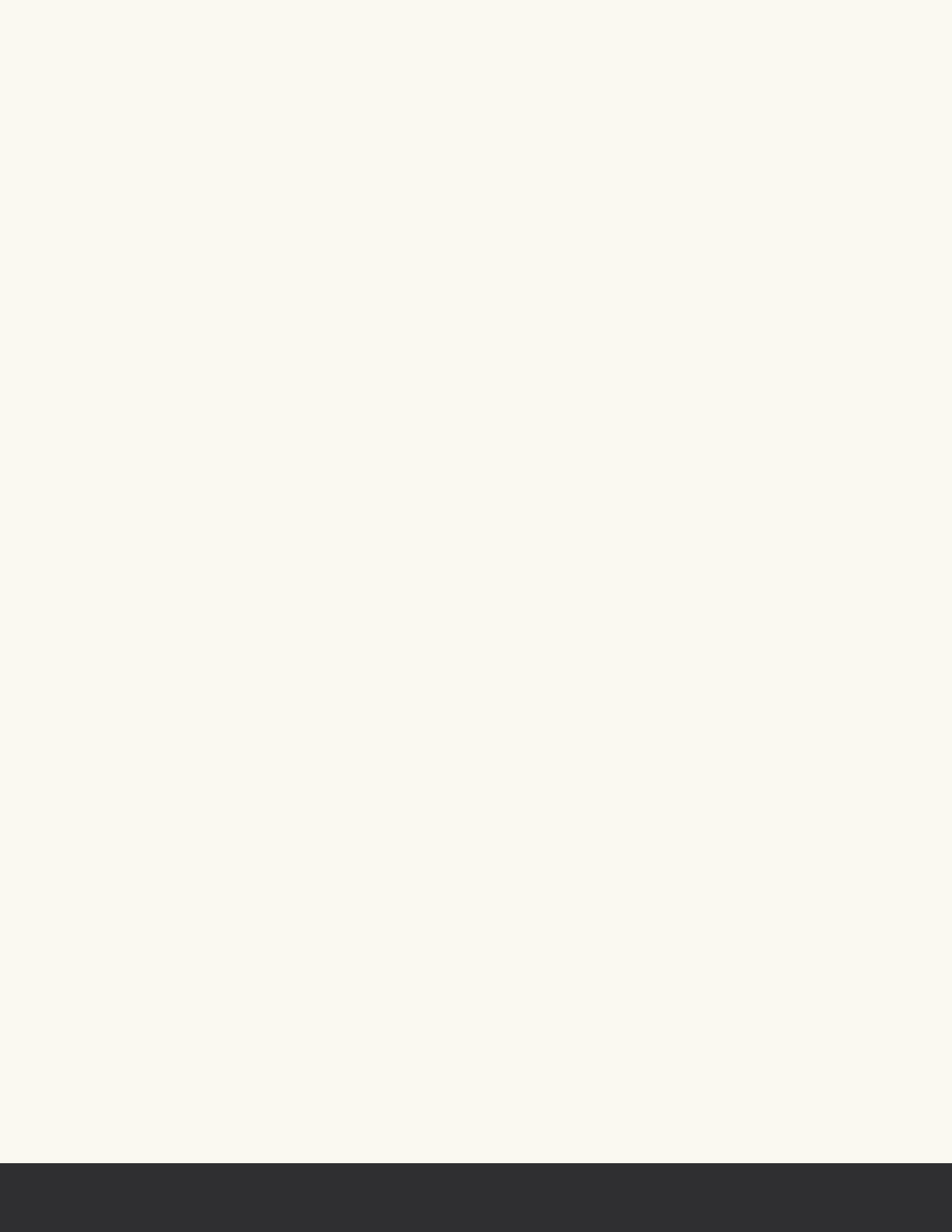
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## Summary

Transportation Asset Management is a “way of doing business.” All Departments of Transportation manage their assets. The question is, are they taking advantage of good Asset Management practices? Applying the Asset Management framework and decision-making process is a way to maximize investments for long-term sustainability, accountability and performance—the overriding demands that increasingly confront US transportation executives. Transportation Asset Management (TAM) provides a proven and reliable framework to address all three demands.

This report distills and updates the findings of a larger report, *Beyond the Short Term: Transportation Asset Management for Long Term Sustainability, Accountability and Performance*. This summary report and the larger one (“Beyond the Short Term”) use case studies to demonstrate how US and international transportation agencies rely on TAM as a systematic framework for managing infrastructure.

The report illustrates how agencies that have implemented TAM can take in stride these new demands for sustainability, accountability and performance. These agencies can rely on TAM to provide a framework to manage resources and preserve physical assets while minimizing their whole-life cost. It can also help them sustain the infrastructure for future users, produce performance metrics, and account for their investment decisions.

This report is intended for executives who want to understand how to change their organizations to fully utilize TAM. It documents the use of strategic planning, organizational theory, change management and organizational communication to shift an agency from a short-term, worst-first approach to a long-term, cost effective, sustainable and accountable Asset Management approach. By doing so, Asset Management’s intrinsic benefits will contribute to sustainability, accountability and long-term performance.

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## Overview

Transportation agencies face the challenge of managing aging infrastructure that carries traffic volumes far beyond what it was designed to handle. US infrastructure continues to age as the “Baby Boom” bridges and pavements of the Interstate Highway era pass their 50th anniversaries. While transportation agencies are coping with aging infrastructure, their purchasing power has sharply declined.

This summary report and the *Beyond the Short Term* report reevaluate and reappraise TAM in a new light. They review TAM from the perspective of current demands that transportation agencies operate sustainably, accountably and with a strong emphasis upon documenting and improving performance. These three issues have received considerable attention at national conferences and within discussions between transportation agency peers.

The reports point out to transportation agency executives who may not have fully embraced TAM that they can rely on it as a ready framework to address these growing demands. Agency executives need to evaluate their decision making process and their organizational framework. The framework needs to clearly address the following five core questions, which constitute the foundation of Transportation Asset Management:

- 1. What is the state of my assets?**
  - a. What do I own?
  - b. Where is it?
  - c. What condition is it in?
  - d. What is its remaining useful life?
  - e. What is its remaining economic value?

## **2. What is my required level of service?**

- a. What is the demand for services by stakeholders?
- b. Are there regulatory requirements I must meet?
- c. What is my actual performance?

## **3. Which assets are critical to sustained performance?**

- a. How can it fail? How does it fail?
- b. What is the likelihood of failure?
- c. What does it cost to repair?
- d. What are the consequences of failure?
- e. How can I mitigate these failures?

## **4. What are my best “Operations and Maintenance” and “Capital Improvement” investment strategies?**

- a. What alternative management options exist?
- b. Which are the most feasible for my organization?

## **5. What is my best long-term funding strategy?**

- a. What revenues will I have?
- b. What is my investment gap or surplus to meet asset condition goals?
- c. What is my revenue gap to keep my asset within my risk tolerance level?
- d. What would be my optimum mix of:
  - i. Preservation and Preventive Maintenance
  - ii. Reactive Maintenance
  - iii. Rehabilitation
  - iv. Replacement
- e. If I cannot afford my optimum mix, what is the best mix of fixes I can afford?

Agencies do not have to adopt three new systems or frameworks for asset sustainability, for providing accountability or for documenting performance. TAM provides a framework for all three, at least in regards to the management of transportation infrastructure.

## **National Calls for Accountability and Performance**

While facing these challenges, transportation agencies increasingly face calls to demonstrate their effectiveness. The National Surface Transportation Policy and Revenue Study Commission issued a clarion call for performance accountability in the federal transportation programs. Senior members of Congress are examining how to tie federal transportation spending to state accountability and performance. The Government Accountability Office called for greater linkage between federal transportation expenditures and transportation agency results. The Federal Highway Administration (FHWA) is placing an increased focus on a performance-based federal transportation program. Discussions are underway on approaches to articulate national goals, performance measures and targets, and the role of states in addressing them.

The American Association of State Highway and Transportation Officials (AASHTO) created a new Standing Committee on Performance Management (SCOPM) that is seeking consensus on common, nationwide performance metrics. It has conducted preliminary studies to identify common measures to evaluate the comparability of data reported by states and to measure performance among states in key areas. Also, FHWA has undertaken a study focused on assessment of infrastructure health with one of the objectives being identification of the best approaches to define pavement and bridge performance for the Interstate Highway System.

The rising prominence of Performance Management raised the need for a clear definition of Performance Management and how it differed from Asset Management. In the summer of 2010 as the AASHTO Subcommittee on Asset Management Strategic Plan was being updated, AASHTO and FHWA collaborated on a statement of clarification about the two complementary disciplines. Though Asset Management and Performance Management have a common



framework, Performance Management can be applied more broadly to include processes including highway operations, safety, construction activities or even customer satisfaction. Although the two often overlap, the delineation between them is marked by Asset Management's focus on *strategic approaches to manage and ensure long-term performance of physical assets* as opposed to the performance of processes.

### Increasing Focus on Sustainability

While these financial and infrastructure trends develop, the public is increasingly focused on sustainability. President Obama issued an executive order in October 2009 calling on federal agencies to embrace sustainability practices. Internationally, transportation agencies in Great Britain, Australia, and New Zealand consider the sustainability of their infrastructure to be a key measure of successful management of assets and an indicator of long-term asset performance. The concept of sustainability grew out of the environmental movement but has since spread to become a universal organizing principle.

In transportation circles, sustainability has grown to include considerations of whether the quality of infrastructure will remain for future users, or are today's users consuming more infrastructure than they are renewing. The taxpayers of the 1950s and 1960s invested in a highway network that serves users today. As the structural integrity of bridges and pavements deteriorate, the costs to restore them to serviceable levels are passed on to future users. If infrastructure investment was sustainable, today's users would be replacing the assets they consume and they would be leaving a legacy of good infrastructure for future users.

### Seeing TAM in a New Light

As transportation agencies consider how to respond to these national calls for a legacy of good infrastructure for future users, the appeal of TAM becomes

increasingly apparent. It has become increasingly clear to TAM practitioners that it provides a systematic, data-driven and continually improving framework for managing assets. In this maturation, Asset Management has come to closely resemble many other "quality systems" that major corporations use to meet customer goals, achieve performance targets and to continually improve their products. "Quality Systems" such as ISO, Six Sigma, the Balanced Scorecard, Baldrige, Total Quality Management and Performance Management all have elements which resemble Asset Management.

Agencies that use Asset Management tend to become more strategic in managing infrastructure assets. They are very data-driven and work towards achieving defined long-term outcomes. Terry Gibson, from the North Carolina Department of Transportation, noted that "adopting TAM leads agencies to migrate to a more policy-based, result-focused, data-driven organization, where producing performance metrics to demonstrate results is practically incidental". The agency officials interviewed in the Beyond the Short Term case studies expressed little trepidation about producing performance metrics because their Asset Management frameworks produce metrics as a matter of course.

### Asset Management as an Organizing Framework

Asset Management is a framework that helps an organization effectively manage its assets. TAM has sometimes been confused with the bridge management and pavement management computer systems. It needs to be stressed that Asset Management is not a computer program nor is it a rigid protocol. Rather, *it is a framework for decision making that propels continuous improvement in infrastructure management* within an organization. Just as some Fortune 500 companies rely on ISO or Six Sigma, an agency can rely on Asset Management to provide an organizing framework to communicate its approach to its workforce, to external stakeholders such as the public, legislators, commissions or the media, and its

external partners such as consultants. As can be seen in the case studies and examples within *Beyond the Short Term*, Asset Management can help agencies

not only improve their management of infrastructure but also respond to larger, public concerns about long-term transportation infrastructure health.

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## Essentials of Asset Management

The *AASHTO Transportation Asset Management Guide—A Focus on Implementation* defines Asset Management as a strategic and systematic process of operating, maintaining, upgrading, and expanding physical assets effectively throughout their lifecycle. It focuses on business and engineering practices for resource allocation and utilization, with the objective of better decision-making based upon quality information and well-defined objectives. Asset Management is a distinct way of doing business. It is more comprehensive than traditional approaches with a framework that focuses on quality data, economic and risk analysis, and development of financial and Asset Management plans. The Asset Management plans feed into priority setting and programming processes to generate a work program for delivery.

Key elements within the definition include “*strategic and systematic*,” “*throughout their lifecycle*,” “*quality information*,” and “*well-defined objectives*.” These elements make Asset Management attractive to legislators and policy makers who are often pleased to find that a transportation agency is using a rational and comprehensive approach to managing infrastructure, not just for the short term, but also for the long term. Asset Management contradicts a common belief that most government agencies “muddle through” their decision-making process by making short-term, incremental decisions based on past practices and not upon rational, comprehensive and data-driven lifecycle processes. Agencies with more advanced asset management programs tend to operate rationally and comprehensively by starting with clear strategies for what infrastructure condi-

tions they want to provide the public. They then use data analysis, and often computerized management systems, to conduct tradeoff scenarios to determine which mix of investments will provide the optimum system conditions for the longest period. As the definition notes, Asset Management involves business and engineering practices. It includes timely preservation and preventive maintenance, well-planned rehabilitation and cost-effective replacement at the appropriate stages of an asset’s life.

Asset Management capitalizes upon three key factors. **First**, pavements, bridges and maintenance appurtenances tend to degrade at predictable rates, so their future conditions can be predicted based upon asset condition history and known deterioration curves. **Second**, timely preservation, preventive and rehabilitative treatments at the right point of the deterioration curve can be very economical because they prevent the rapid degradation of assets that occurs once they reach a deteriorated state. Restoring severely degraded assets is more costly than preserving them in a sound state. **Third**, assets have significantly different values, such as high-volume pavements and bridges create more public value than do lightly traveled ones. By carefully assigning economic values to assets and by prioritizing the treatment of those which have the highest economic value and by setting appropriate treatment timings, transportation agencies can optimize scarce resources. This systematic optimization allows agencies to “*get the biggest bang*” for their scarce infrastructure resources and demonstrate that they are taking a rational and systematic approach to maximizing public resources.

Asset Management coordinates multiple areas such as finance, policy, engineering, planning, design, project delivery, forecasting system conditions, customer demands, and information needs. It applies them to an implementable asset management plan that is supported by a financial plan. Asset Management is distinguished by being:

**Policy-driven**—Resource allocation decisions are based on a well-defined set of policy goals and objectives.

**Performance-based**—Policy objectives are translated into system performance measures that are used for both day-to-day and strategic management.

**Reliant on Analysis of Options and Tradeoffs**—Decisions on how to allocate funds within and across different types of investments (e.g., preventive maintenance versus rehabilitation, pavements versus bridges) are based on an analysis of how different allocations will affect achievement of relevant policy objectives.

**Based on Quality Information**—The merits of different options with respect to an agency’s policy goals are evaluated using credible and current data.

**Providing Accountability and Feedback**—Performance results are monitored and evaluated for both efficiency and effectiveness.

**Financial Information**—Financial information is compiled including the answers to questions such as, How much money do we have? How much money do we need to manage our assets so as to keep risks within acceptable levels? What are the current and future needs and trade-offs? How much will it cost in the future to maintain a newly built road?

**Continuously Improving**—The performance feedback allows for continuous assessment of results and “institutional learning” of how to improve upon past performance.

In short, Asset Management is a comprehensive, rational and systematic approach to managing pavements, bridges and other transportation assets. Asset Management does not require a new bureaucracy, rather it is a “*way of doing business*.” It brings a particular perspective to how an agency implements existing procedures, reaches decisions, and applies its information-technology capabilities. It suggests principles and techniques to apply in policymaking, planning, project selection, program tradeoffs, program delivery, data gathering, and management system applications.

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## Changing Organizational Direction to Embrace TAM

In a fully coordinated Asset Management environment, both funds and activities are optimized. Preservation, preventive or reactive maintenance activities and schedules are coordinated during the assets’ lifecycle. Often such coordination does not occur naturally when an organization’s units may try to maximize their priorities at the expense of other organizational priorities.

Asset Management “*aligns the organizational arrows*” and links the processes so that all business units within an agency operate in a coordinated fashion rather than independently. This could include shifting money and resources between asset classes or between activities in order to optimize overall performance. Resource allocation would be systematic and dynamic with resources shifted over the years. Such a coordination of people and

processes requires addressing the following three major information areas:

- I. Organizational Directional Information;
- II. Organizational Competency Information; and
- III. Organizational Asset Data.

## The Three Major Information Areas in Asset Management

### I. ORGANIZATIONAL DIRECTIONAL INFORMATION

Organizational directional information seeks answers to an organization's readiness and commitment to TAM. Is the organization's commitment to Asset Management clear? Has the organization understood and bought in to the Asset Management approach? Is it cascading the approach actively throughout the organization?

#### Role of Leadership in the Success of TAM

Successful implementation of TAM may require making organizational changes and overcoming institutional inertia. This requires having an Asset Management champion at a high level of an organization. If the implementation of TAM is being driven by a Commission, Legislature or CEO, it probably has an automatic champion. If those conditions do not exist, a champion should be appointed and the higher in the organization, the better. This champion, in many instances, is supported by a broad-ranging committee representing all major departmental areas and can spread the advocacy widely across the organization.

The *Beyond the Short Term* report provides recommendations and examples of *Change Management, Organizational Theory and Organizational Communication* for how to chart a new course for an organization that wants to adopt Asset Management.

As many executives have found, coordinating disparate units within a large organization is a

challenge in itself. In fact, *making organizational change and addressing institutional inertia* are amongst the top issues that change agents face when they attempt to institute improvements within a large agency. Tactics borrowed from Organizational Communication, Organizational Theory and Change Management, are manifested throughout the case studies of successful agencies represented in this report. By adopting these change-management tactics, an agency leader can increase the chances of success when deploying Asset Management principles in an agency.

**Making Organizational Change**—For change to take place, it is important to understand why organizations do what they do and what it takes to get them to adopt new practices. The various complex interactions and cooperative functions that must occur *across units* in an Asset Management framework are not naturally occurring tendencies to officials whose normal incentives are to work within their own units. However, because division officials tend to be rational, they will cooperate and respond more positively to peer units when the organization creates greater incentives for them to do so. A leader is needed to create the environment that provides incentives to cooperate fully with other units in a long-term approach to Asset Management. It takes leadership to adopt new practices that are not common in the organization, get divisions and individual personnel to change past practices and make difficult financial-tradeoff decisions. It is important for the various organizational units to understand the framework and decision making process, so they know and understand where they fit in.

**Overcoming Institutional Inertia**—The case studies detailed in the larger *Beyond the Short Term* report illustrated that enhancing coordination and overcoming institutional inertia occurred through strong leadership and change management efforts. To change an organization, the leadership clearly stated the new direction and made a clear case for

change. Probably the most important information needed to begin an Asset Management transition is the information that leadership provides about the “why, how and when” the institution is embracing Asset Management.

**Breaking Silos and Aligning Arrows to Work Towards One Common Goal**—Organizational consensus and strong leadership are important because it takes nearly all the functions of a highway agency to effectively manage a pavement or a bridge through its lifecycle. Traditionally separate functions often become linked in an Asset Management process requiring cross-cutting coordination. The optimized structure for Asset Management would have all team members or divisions clearly understanding their role in the larger strategy that involves a life-cycle approach to sustaining transportation assets for the lowest possible cost.

To take a simple example, a maintenance official will have no rational incentive to crack seal if the long-term performance of pavements is not part of his or her incentives or disincentives. In the short-term, crack sealing provides few benefits to the maintenance official who may be pre-occupied with snow removal, clearing incidents, repairing damaged guardrail or mowing. Furthermore, if the timing of crack sealing is critical, then the prescriptive timing of the crack sealing operations can become a new and unwelcome intrusion for the maintenance official. However, when a leader re-defines the units’ objectives and functions, the officials’ perspectives change. When the silos are broken and the role of maintenance is re-defined to contribute to long-term pavement performance through crack sealing or drainage maintenance, then maintenance behaviors change. Likewise, the rational behavior of the unit changes further when the leader creates new objectives for it to cooperate with other business units such as planning, design and construction.

When an organization has clarity and buy-in on Asset Management, the role of each unit becomes

clear. Collaboration across business units and clarity about the shared requirements also improves and all units function in a coordinated fashion to execute the thousands of individual steps required.

In summary, the case study agencies used leadership, organizational structure and communication strategies to break down silos and enhance multi-disciplinary cooperation. Successful tactics that are necessary to inculcate the cross-divisional cooperation include:

- The open and participatory conduct of economic tradeoff analyses and Asset Management planning that explain why it is in the larger organization’s interest to change funding patterns and practices to optimize the state’s highway assets;
- Frequent cross-divisional meetings that are chaired by the leader in which the cross-cutting cooperative activities are monitored for success, and impediments to their success are identified and addressed;
- The leader formally redefines the roles of units and individuals to require cross-divisional cooperation with one another;
- Shared institutional goals are set as common to all units, not only to some;
- The long-term accomplishment of Asset Management goals are broken down into meaningful, short-term activities that are clearly assigned to individuals and units. Those individuals and units are then held accountable for their accomplishment;
- Published reports, web pages, employee meetings and performance evaluations are used to communicate the department’s embrace of Asset Management as the process it uses to make infrastructure decisions.

## II. ORGANIZATIONAL COMPETENCY INFORMATION

The second major informational area is organizational competency information. Often a competency gap exists in an organization where Asset Management is not fully deployed. The leadership should consider developing a strategic plan or articulating a strategic vision that clearly states its long-term goals in support of Asset Management. This will involve assessing the size of this institutional competency gap and then devising an implementation plan that addresses the gap. The *AASHTO Transportation Asset Management Guide—A Focus on Implementation* discusses the self-assessment that will help agencies identify gaps in four key areas: Policy Guidance, Planning and Programming, Program Delivery, and Information and Analysis.

### Strategic Elements to Consider in Implementing Asset Management:

- “Preservation first” will be an organizational priority;
- The understanding that “worst first” treatment strategies are *secondary to life-cycle-cost* treatment strategies;
- Fact-based decision making will be the norm;
- “Continuous improvement” and “institutional knowledge management” will become part of the organizational culture;
- Short-term objectives and performance measures will be deployed as incremental steps toward achieving the long-term goals;
- Processes will track the steady progress toward implementing projects, maintenance treatments and preventive maintenance operations to attain the multi-year, long-term Asset Management goals;

- The workforce will be skilled in preventive-maintenance treatments;
- The department will be competent in scenario forecasting and have the ability to extrapolate different programmatic strategies and funding levels to determine their costs and benefits;
- The department will be competent in conducting benefit/cost analyses both at the program and project level.

## III. ORGANIZATIONAL ASSET DATA

The third major informational area is organizational asset data. This is the category of data that is most often recognized as essential to Asset Management. In fact, a common misconception about Asset Management is that it involves only computer programs such as Pavement or Bridge Management Systems dependent upon state-of-the-art enterprise-wide computer systems. In fact, Asset Management requires all three types of information discussed in this report, but it is the Organizational Asset Data that is the most technical, detailed and expensive to acquire. It should be stressed that the acquisition of sufficient data and information for Asset Management *is a continuous journey*, not a point of departure.

State-of-the-art systems are extremely desirable and they are powerful adjuncts to mature Asset Management processes. However, “*begin with what you have and build upon it*” is repeatedly stressed in guidance worldwide. Spread sheets, data bases and simple forecast curves are often the foundations of Asset Management information systems.

**Categories of Asset Data**—The International Infrastructure Management Manual identifies the following categories of data that underlie sound Asset Management.<sup>1</sup> They include:

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<sup>1</sup> International Infrastructure Management Manual, Version 3.0, 2006, page. 2.10

**Asset Inventories**—These are the basic data regarding the bridges, pavements, maintenance appurtenances, traffic control devices, equipment and facilities that comprise the total inventory of the department’s physical assets. Generally, this information includes at least current condition and location information.

**Level of Service Data**—Data as to the desired level of service compared to the existing level of service is clearly desirable in Asset Management information systems.

**Predicted Future Demand Data**—This data is often volume-based such as traffic forecasts. This data is important for forecasting future demands, such as loadings on pavements or bridges.

**Remaining Useful Life Forecasts**—If the preceding data exists, it generally is possible to forecast the remaining useful life of assets. The remaining useful life can predict failure scenarios and is fundamental to accurate forecasts of financial needs.

**Risk-Analysis Data**—The risk-sensitivity of items such as fracture-critical bridges or traffic control devices is quite high. The desired asset data would include indicators of risk for structures or other asset items that have a high-degree of risk.

**Treatment-Sensitivity Data**—The relative effects of various treatments upon the remaining service life of assets is important and desirable. These data preferably are derived from statistical analysis of a vast array of past examples but they can be generated by engineering judgment or “rules of thumb” in early Asset Management programs.

**Benefit/Cost Data**—Closely related to treatment-sensitivity data are benefit/cost data that can be used to generalize the return-on-investment of various treatments or strategies.

**Fiscal Forecasts**—Forecasts of predicted revenue

based upon likely economic and political scenarios are necessary to evaluate potential investment options.

### **Use of Metrics as the Guideposts for Long-term Health and Improvement**

With the increased focus on Performance Management, there are significant nuances to addressing highway assets over the long-term. Care needs to be taken as to which performance targets and strategies to adopt to ensure the long-term performance and sustainability of assets.

One of the common concerns about Performance Management is that it can encourage short-term thinking. Managers face pressure to achieve short-term metrics and therefore have little incentive for long-term investment or strategies. In Asset Management, the agency’s physical assets are *managed cost-effectively for the highest performance over their multi-decade lifecycle*. In an Asset Management framework, a manager would be encouraged to consider accepting lower network pavement conditions today by reducing the miles of “worst-first” pavements treated. By adopting a more sophisticated pavement management approach, the program would include more preventive maintenance, preservation, pavement rehabilitation or pavement replacements that provide longer-term benefits.

Most organizations that have sustained long-term performance devise short-term objectives and performance measures that are deployed as incremental steps toward meeting the long-term goals. Failure to achieve the short-term performance measures triggers assessment or “learning” as to what needs to change in order to achieve the desired outcome.

If an agency lacks clear performance measures and a process to track them, it probably lacks a critical element of Asset Management. Steady progress toward preservation and preventive maintenance

operations are essential if the organization is to attain its multi-year, long-term Asset Management goals.

The *Beyond the Short Report* identified Asset Management performance measures from Australia and the United States that reinforce sound engineering and sound Asset Management practices. For instance, a reliance on short-term asset condition metrics can reinforce a “worst-first” mindset. Performance metrics that address strategic preservation and preventive maintenance reinforce the implementation of sound and sustainable long-term Asset Management strategies.

The Australian states of Queensland, New South Wales and Victoria have been the subject of several international case studies of sound practices in both measuring performance and in managing highway assets. The transportation agencies in these states

widely use performance metrics to illustrate their responsibility and accountability in managing their highway networks. They select their performance metrics from their Asset Management analyses to ensure that what they measure will lead to the responsible management of the highway network. For instance, they measure activities such as their achievement of rational preventive maintenance programs or their delivery of well-planned pavement rehabilitation. By measuring preventive maintenance and pavement rehabilitation programs, they are measuring activities that will sustain their highway systems over time, not just in the short term. In fact, these agencies could not have a *responsible performance measurement* system if they did not first have a *responsible Asset Management* system that identified the strategies and treatments that will sustain their networks into the future.

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## Implementing Transportation Asset Management

Because Asset Management takes a rational and comprehensive approach, it is only logical to proceed with a rational and comprehensive effort to implement it within an organization. The *AASHTO Transportation Asset Management Guide—A Focus on Implementation* recommends a 14-step process to implementing TAM. These are broadly covered in the following:

- Assessing where you are;
- Identifying gaps;
- Setting goals and objectives;
- Developing a TAM Plan;
- Implementing the TAM Plan;
- Communicating the TAM Plan;

- Learning from peer exchanges and best practices.

### Assessing Where You Are

Beginning the process of implementing Asset Management, or evaluating the success of existing efforts can start with a self-assessment. Both volumes of the AASHTO Asset Management guide include a self-assessment instrument that allows an agency to determine where it stands. Agencies typically administer the self-assessment to a wide array of personnel to gather perspectives from across the agency. The self-assessment covers four broad areas including Policy Goals and Objectives, Planning and Programming, Program Delivery, and Information and Analysis. The results allow an organization to identify its strengths and weaknesses from broad areas such as goals to very specific ones such as the type of data its users want, but lack. The self-assessment repeatedly has assisted agencies with the next key step, the identification of gaps.



## Identifying Gaps

Each agency is unique and each is likely to have a unique set of needs it will identify to fulfill its Asset Management aspirations. The value of the self-assessment lies in combining a standardized, idealized template for Asset Management with internally generated assessments for how to best achieve the agency's Asset Management aspirations. The self-assessment asks a series of questions that are relevant to a generalized Asset Management template. Because the answers are generated by the agency stakeholders, they provide a personalized set of answers that are relevant to the individual organization. By administering the self-assessment to policy makers such as commissioners, it can provide the agency with a clear understanding of how to address policy makers' concerns about the organization's Asset Management practices. This feedback also incorporates the external perspective of the legislature, other stakeholders and the public. By administering the self-assessment to employees, it also provides an internal perspective of how staff views the agency's Asset Management strengths and weaknesses.

## Setting Goals and Objectives

Because Asset Management is tailored to serve the unique needs of each agency, the specific goals and objectives it intends to achieve are determined by the agency itself. After the self-assessment and gap analysis, one of the first steps is for the agency leadership to identify the appropriate goals and objectives. These will not only guide the activities that follow, but they also should define for the organization what it seeks to achieve for itself and its stakeholders.

The case studies illustrate how the leadership of five different organizations articulated Asset Management goals for their organizations. Some leaders developed the goals to guide the staff's implementation while others organized teams to develop the

goals themselves. Either way, the goals serve an important function of clarifying to all stakeholders what the agency seeks to achieve and how it seeks to achieve it.

## Developing a TAM Plan

A strategy adopted by several successful Asset Management agencies was to develop an Asset Management Strategic Plan and an Implementation Plan. Although not universally used, Transportation Asset Management Plans (TAMPs) are recommended in the new Asset Management Guide and by the International Infrastructure Management Manual. TAMPs vary considerably with some being high-level, policy documents while others are more detailed with goals, objectives, performance measures, organizational structures, roles and responsibilities, and monitoring mechanisms to measure performance. The plans can be self-contained with all necessary elements to implement Asset Management, or they could be briefer documents that are augmented by implementation strategies. Either way, the Asset Management advocates can use the TAMP to clarify directions and set a path for implementation.

## Incorporating Risk Management

Another core competency that agencies must consider and seamlessly integrate into the TAM plan is risk management. Risk is defined as "*the positive or negative effects of uncertainty or variability upon agency objectives*". The current state of the nation's transportation infrastructure and fiscal realities are resulting in congressional calls for transportation agencies to take a risk-based approach to managing transportation assets. US transportation agencies have for decades applied risk management at the project level. Increasingly DOTs are integrating risk management more formally into the development of their asset management plans. This includes addressing the following questions:

### **1. What are the risks to my assets?**

- a. What are the asset risks to the enterprise or the agency as a whole?
- b. What are the asset risks at the program or asset class level?
- c. What are the risks at the project level or to specific assets?

### **2. What is my asset risk tolerance and mitigation strategy?**

- a. Which critical assets are at high risk?
- b. What is the risk tolerance at the enterprise, program and project level?
- c. What is the cost to keep my assets within the acceptable risk tolerance levels?
- d. What is my financial asset risk gap?
- e. What is my risk mitigation strategy?

## **Implementing the TAM Plan**

Implementing Asset Management involves changing some behavior and coordinating the activities of many units and individuals. An official implementation plan or at least a formal implementation process can assist the agency in coordinating and monitoring the many tasks and many individual steps that are required. Often, agencies adopt both an implementation plan and a coordinating or reporting process or body to keep the plan on track. Oversight groups, regular updates, group meetings, performance tracking, and schedule monitoring are the typical types of project-management tools used to successfully implement an Asset Management plan.

## **Developing a Communication Plan**

Augmenting the implementation with a communication plan can be helpful. Because of the large number of highly distributed people and functions that need to be coordinated, communication is key. Asset Management requires high-level and abstract attributes such as long-term vision and strategic goals. It includes detailed and concrete attributes such as current condition data for millions of fields

of asset inventory databases. To carry out the Asset Management plan, department employees and vendors must understand not only the long-term vision but also the detailed technical requirements of providing the data, conducting the asset assessments, programming the correct projects and conducting the proper maintenance to achieve the long-term vision. A communication plan and effort can serve an important coordination function. It can provide motivation, make note of accomplishments and maintain momentum.

The personal involvement of the leader can be an important component of the communication effort. Effective communication includes both formal and informal communication, with the informal communication often being the most effective. When employees see the personal engagement of the leader in the Asset Management implementation effort, it reinforces the importance and communicates the commitment of the leadership to Asset Management.

An external communication plan helps keep the external stakeholders informed, involved and supportive of the agency's TAM effort. Communicating the progress made and next steps being pursued in the implementation of TAM also shows accountability and adds credibility to the agency's efforts.

## **Benchmarking Best Practices**

Throughout the development of the Asset Management Plan and the implementation stage, peer exchanges and the identification of best practices can play an important role. They provide benchmarks against which an agency can measure itself. They provide real-world examples of what worked and what didn't when peers deployed Asset Management. They can boost morale by bringing in advocates and champions who have "been there" and can relate to the difficulties of implementing Asset Management. Peer Exchanges and the documentation of best practices also can validate the efforts by

illustrating the benefits other agencies achieved when they successfully completed their implementation.

They also highlight how peers addressed challenges and overcame obstacles. Throughout the process,

peer exchanges and noting of best practices can provide benchmarks and motivation for the implementation effort.

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## Examples of Successful TAM Implementation

The case studies within *Beyond the Short Term* illustrate how questions about sustainability, accountability and performance are being addressed by the state transportation agencies in practical, straight-forward ways. In each case, the agencies reported that by addressing the Asset Management questions, they were better able to sustain their assets, account to legislators and document their long-term performance and strategies. Each case study highlights a different element of sustainability, accountability and performance that the agencies achieved through their Asset Management practices.

North Carolina used TAM to develop a tiered approach to categorize the transportation network and prioritize investment strategies linked to maximizing mobility and connectivity to a core set of highway corridors. This tiered approach helped the agency get buy-in and support from the legislature and the public to shift resources from low-volume roads and invest proportionally more resources to higher-volume and more economically important transportation segments. For North Carolina, Asset Management has become a central organizational principle that is helping the strategic re-focusing of efforts and financial priorities.

In Utah, the agency director led an organization-wide epiphany that the agency should invest the same effort and enthusiasm into preserving its assets as it displays in building new ones. After the agency reflected upon its immense accomplishment of improving I-15 before the 2002 Salt Lake City Olympics, the director led the agency on an effort

to identify how it should manage the “whole-life” of the new assets. That effort resulted in an agency-wide focus upon Asset Management down to the individual maintenance appurtenances at the county level.

In Missouri, a major focus on addressing customer feedback regarding ride quality led to a focus on improving system conditions. As asset conditions improved, so did safety, customer satisfaction, ride quality and the department’s public credibility. The Missouri case study documents the use of customer feedback to address specific aspects of improving the performance of transportation assets.

The Oregon case study illustrates how the agency took a systematic approach to communicating and coordinating its effort to shift from a “worst-first” to a more long-term Asset Management approach. The agency broke down institutional barriers and organizational silos through a formal Asset Management strategic planning effort that included formal plans for information technology, internal communication and implementation of an Asset Management program.

The Maryland transportation agency’s Asset Management program also grew from its performance-enhancement efforts including its Baldrige quality approach. The agency began with performance measures and evolved to a long-term Asset Management approach for all major assets. The agency leaders attribute their Asset Management focus for playing a major role in the Maryland

legislature increasing investment for system preservation. They were able to explain a rational, long-term approach to managing their highway assets that resonated with their legislature.

These *Beyond the Short Term* case studies illustrate that Asset Management is not an abstract concept

that is unrelated to the day-to-day pressures that transportation executives face. Rather, Asset Management is the solution they embraced to help them with their most complex challenges—the managing of large and aging highway networks in the face of steadily eroding revenue and increasing public expectations

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## Conclusions

Asset Management principles have long been recognized as a means to sustain highway conditions over time to identify a sequence of maintenance, preservation, repair, rehabilitation, and construction actions that will achieve and maintain a desired state of good repair over the lifecycle of the network at the least possible cost. However, Asset Management also can be considered as the primary process by which sound, long-term performance metrics can be produced for transportation infrastructure. In an era of accountability, Asset Management practices can produce an abundance of sound performance metrics that not only satisfy short term reporting requirements but also ensure the long-term performance of highway assets.

The increasing focus upon accountability in transportation programs is based in large part upon a growing need to demonstrate responsibility. Public agencies are under increasing pressure from skeptical taxpayers, legislators and the media to demonstrate that they are acting responsibly with public resources. The achievement of performance targets is viewed as evidence that the agency is responsibly using its limited resources to achieve performance that serves the public.

More than 20 years of study of performance measurement has repeatedly illustrated that achieving short-term performance targets alone does not guarantee that an organization is making the best

long-term decisions. Management frameworks such as the Balanced Scorecard, Six Sigma, Baldrige, ISO and Total Quality Management have arisen to provide a more holistic framework for examining an organization's processes. The adoption of these frameworks has been widely accepted as a representation of the agency's commitment to act responsibly toward its customers, to maximize the resources of its stakeholders and to ensure its long-term viability in a constantly changing business environment.

Asset Management can provide for a transportation agency the same framework of long-term viability and continuous improvement that these other quality frameworks provide for Fortune 500 companies. When an agency selects its performance targets from among the critically important components of Asset Management processes, then the agency is far more likely to be measuring performance that will ensure long-term sustainability of its highway networks.

Asset Management can be the framework for satisfying several mission-critical needs.

- **First**, it can provide an organization a long-term rational framework for making its infrastructure management decisions.
- **Second**, it can be a template that dispersed and far-flung agency staff can use to make repeated,

and on-going day-to-day decisions about how to responsibly treat the assets under their jurisdiction.

- **Third**, Asset Management can be a framework for programmatic decision making that allows high-level executives to make rational tradeoffs in investments between classes of transportation assets.
- **Fourth**, and perhaps of growing importance, Asset Management practices can provide executives with a defensible, long-term set of metrics with which to demonstrate that their organizations are accountable, responsible and seek to be sustainable.

An unavoidable lack of resources may threaten the long-term sustainability of asset conditions, but with an Asset Management process in place the executive can demonstrate that limited resources are being invested within a rational, thoughtful and fact-based framework.

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