Transportation Asset Management Plan:

Ready or Not,
Here Comes The New Paradigm

or

The Long Slow Road to Change

Asset Management Defined

"…a comprehensive and structured approach to the long-term management of assets as tools for the efficient and effective delivery of community benefits."

Strategy for Improving Asset Management Practice, **AUSTROADS 1997**

Asset Management Defined

"…a methodology needed by those who are responsible for efficiently allocation generally insufficient funds amongst valid and competing needs."

The American Public Works Association Asset Management Task Force, 1998

Asset Management Defined

"Asset Management...goes beyond the traditional management practice of examining singular systems within the road networks, i.e., pavements, bridges, etc., and looks at the universal system of a network of roads and all of its components to allow comprehensive management of limited resources. Through proper asset management, governments can improve program and infrastructure quality, increase information accessibility and use, enhance and sharpen decision-making, make more effective investments and decrease overall costs, including the social and economic impacts of road crashes ."

Organization for European Cooperation and Development Working Group, Asset Management Systems, Project Description, 1999

Asset Management in US

- Intermodal Surface Transportation Efficiency Act (ISTEA) 1991
    - *National Highway System (NHS)*
- Transportation Equity Act for the 21st Century (TEA-21) 1998
    - *FHWA Office of Asset Management*
- Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) in 2005
- Moving Ahead for Progress in the 21st Century Act (MAP-21) in 2012

Asset Management Defined

- Asset management is a strategic and systematic process of operating, maintaining, and improving physical assets, with a focus on engineering and economic analysis based upon quality information, to identify a structured sequence of maintenance, preservation, repair, rehabilitation, and replacement actions that will achieve and sustain a desired state of good repair over the lifecycle of the assets at minimum practicable cost.(23 U.S.C. 101(a)(2), MAP-21 § 1103)

Why Asset Management Now

- Transportation Agencies have Outstanding Historical Record of Effective Asset Management

- But…

1. Changes in Transportation Environment
    - High User Demand
    - Budgets Stretched by Requirements
    - Declines in Staff Resources
    - Mature Assets w/ Ongoing Deterioration

Why Asset Management Now

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- But…

2. Changes in Public Expectations
   - Investment of Public Tax Dollars
   - More Communication Opportunities
   - Public Holds Agencies Accountable
   - Requires Explicit & Clearly Defined Goals

Why Asset Management Now

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- But...

3. Extraordinary Advance in Technology
    - More Sophisticated Analytical Tools
    - Technology to Support Comprehensive, Fully Integrated Systems
    - Ability to Perform What-If Analysis
        - Impact of Various Budget Levels on System Condition & Performance

The New Paradigm

Cornerstone of MAP-21's highway program transformation is the transition to a performance and outcome-based program

The New Paradigm

MAP-21 National Performance Goals for NHS:

- Infrastructure Condition
  - Maintain the highway infrastructure asset system in a state of good repair
- Safety
  - Achieve a significant reduction in traffic fatalities and serious injuries on all public roads
- Congestion Reduction
  - Achieve a significant reduction in congestion
- System Reliability
  - Improve the efficiency of the surface transportation system

The New Paradigm

MAP-21 National Performance Goals for NHS:

- Freight Movement and Economic Vitality
    - Improve the national freight network
    - Strengthen the ability of rural communities to access national and international trade markets
    - Support regional economic development
- Environmental Sustainability
    - Enhance the performance of the transportation system while protecting and enhancing the natural environment

The New Paradigm

MAP-21 National Performance Goals for NHS:

- Reduced Project Delivery Delays
  - Reduce project costs
  - Promote jobs and the economy
  - Expedite the movement of people and goods by accelerating project completion by:
    - Eliminating delays in the project development and delivery process
    - Improving agencies' work practices
    - Reducing regulatory burdens

Immediate Deliverables

MAP-21 Requires each State DOT to Develop A Risk-Based Transportation Asset Management Plan (TAMP) for the National Highway System

TAMP – "An essential management tool that brings together all related business processes and stakeholders, internal and external, to achieve a common understanding and commitment to improve performance."

Immediate Deliverables

TAMP Requirements:

- Management Systems for NHS Pavements & Bridges
- Asset Management Objectives & Measures
- Performance Gap Identification
- Life Cycle Cost
- Risk Management Analysis
- A Financial Plan
- Investment Strategies

Immediate Deliverables

The TAMP needs to achieve the following objectives:

- Identify policies and procedures to allocate funds to preserve and maintain the existing highway system
- Determine how existing plans (e.g., the Statewide Transportation Improvement Program, Statewide Transportation Plan, Strategic Plan, etc.) tie together in terms of a comprehensive, coordinated asset management process

Immediate Deliverables

The TAMP needs to achieve the following objectives:

- Develop and document a TAMP governance process
  - Define the individuals responsible for management of the TAMP
  - How it will be used throughout the Agency
  - How it relates to other Agency documents
  - When will the TAMP be updated
  - How the Agency will periodically assess its asset management program

Immediate Deliverables

The TAMP needs to achieve the following objectives:

- Develop a plan to implement the TAMP
- Continue enhancements after the initial TAMP is complete
  - What additional assets classes to consider adding
- Meet the requirements of MAP-21
  - Rule Making delays

Implementation Guidelines

"A Strategic Framework to Support the Implementation of Transportation Asset Management in State Transportation Agencies"

Developed by the Transportation Asset Management Expert Task Group (TAM ETG)

Implementation Challenges

- Institutional & Organizational Factors
- Data Collection & Measurement
- Data Integration & Decision Making
- Availability of Tools & Analytical Capabilities
- Need for Training & Technology Transfer for Workforce Development

Table 2. Challenges to AM development and implementation (from NCHRP Synthesis 439).

Challenges	Responses*	Percent
Lack of resources (e.g., funding, equipment)	35	81 %
Lack of staff	29	67 %
Resistance to change	26	60 %
Inter-departmental interactions	25	58 %
Higher and other priorities	22	51 %
Lack of expertise and training	22	51 %
Staff commitment	18	42 %
Executive commitment	14	33 %
Staff turnover	11	26 %
Availability of adequate tools in the marketplace	9	21 %
Outside pressure to have a subjective approach	8	19 %
Lack of guidance and support	2	5 %

*43 agencies responded, but multiple answers were allowed.

Gaps (Issues)

Using the results of the synthesis as a base, the TAM ETG identified a variety of factors that limit the ability of state highway agencies to fully utilize asset management. These gaps, which are listed below, range from the availability and capacity of agency employees to the availability of the processes and tools to support an asset management analysis.

- **Agency resources**: The availability of agency resources to support asset management activities is limited and many agencies are not filling vacancies that are created.

- **Agency awareness, knowledge, and understanding**: Asset management represents a new way of doing business, which requires new skills and changes to the types of individuals being hired in transportation agencies.

- **Public understanding**: The common approaches to communicate funding needs have not addressed funding needs in transportation. Additionally, the long-term consequences of deferring asset preservation activities are either not understood or are being ignored.

- **Stewardship**: More elected officials and agency executives need to be made aware of their role as stewards of transportation assets. As a result, they do not place a priority on preserving the value of these assets over time.

- **Organizational culture:** Since these agencies were created, state and federal transportation agencies have primarily focused on expanding and rehabilitating the highway system. Today's economic climate demands that transportation agencies change the organizational culture to support the new way of doing business. These changes involve transitioning from a culture focused on system expansion to system preservation and placing more of an emphasis on system optimization over project optimization.

- **Leadership support and commitment:** Asset management demands the support and commitment of agency leadership in setting policies and investment priorities. Executive support is also instrumental in facilitating the business process and other organizational changes needed to build an organizational culture that supports performance-based decisions.

- **Funding structure:** Historically, transportation funding has been allocated into a number of different formula programs, each of which has their own requirements for using funds. MAP-21 places more of an emphasis on managing to performance outcomes that are documented in the TAMP. MAP-21 also consolidates the funding for some programs, but the remaining programs can influence the amount of flexibility that state highway agencies have in making asset management investments. Changes in existing federal and state policies may also be needed to support investments that optimize system performance rather than focus on optimizing project performance.

- **Data and Systems:** In the past, agency personnel collected the data they needed to make investment decisions independent of other uses for the data. Efforts to improve agency efficiency are forcing transportation agencies to coordinate data collection efforts and to strive for consistent data standards so data can be integrated on an agency-wide basis. Advances in technology have significantly improved data coordination and integration efforts. However, some of the existing technology is under-utilized. In other instances, analysis tools have not yet been developed to provide some of the capabilities desired in using and analyzing available data.

- **Risk Management:** MAP-21 requires the consideration of risk in developing an asset management plan. Although most transportation agencies have accounted for risks on individual projects, the systematic consideration of agency and program risks is a new concept that is not well understood. Among agencies that have considered risk, there is no consistent approach being used. Therefore, guidance is needed on how to better incorporate and use risk in making investment decisions.

- **Long-Term Financial Planning:** Internationally, transportation agencies have developed metrics leading to sustainable transportation systems through a focus on long-term financial plans that balance the trade-offs between anticipated revenue and the funding needed to achieve performance targets. These concepts are not widely understood or utilized within the United States.

Table 3. Contributing factors influencing each gap area.

Gaps	Organizational Capacity	External Stakeholder Influence	Availability of Processes and Tools	Financial Management
Resources: **Agency Resources**	• Staff shortages exist due to retirements and decisions not to fill vacancies • The organizational structure does not easily accommodate cross-cutting activities • Agency knowledge is retiring faster than it is built	• There is external pressure to reduce the size of government agencies	• Resources are not always available to maintain data and systems over time • The benefits associated with improved data cannot easily be documented and conveyed to decision makers	• Work activities are contracted out due to staff shortages
Resources: **Agency Awareness, Knowledge, and Understanding**	• Asset management is not part of a traditional engineering curriculum • DOTs have not typically hired business majors • Existing workloads limit the time available to acquire new skills	• Reasons for using asset management are not well known or understood beyond what is legislated	• Staff are not always aware of available tools and products • Staff do not have the knowledge or experience to know what questions to ask or to evaluate the suitability of available tools and products	• Fiscal constraints are forcing agencies to be more efficient with available resources
Resources: **Public Understanding**	• Benefits to improved asset management are primarily subjective rather than objective • Agencies rely on traditional methods of conveying needs, which have not been effective at driving change	• The benefits of asset management are not well understood outside of the transportation community • Consequences of deferring preservation activities are not well known • Traditional measures of performance have not motivated decision makers in the past	• It is difficult to quantify the benefits associated with improved decisions or better data	• Long-term consequences of limited investments in transportation are not well understood or are not convincing
Leadership: **Stewardship**	• Methods of conveying investment needs that lead to fiscally sustainable programs are not well understood • There is little guidance available to help agencies strengthen their roles as system stewards	• Elected and appointed officials have not embraced their role as stewards of the transportation system • MAP-21 requirements will lead to improved transparency and accountability	• Mandates for compliance with standards such as safety and handicap access are often based on highway project location instead of locations of greatest benefit	• Financial managers have not traditionally been involved in asset management activities
Leadership: **Organizational Culture**	• Most agencies have a short-term rather than long-term focus • Efforts of individual champions may start an initiative, but are not sufficient to sustain the initiative over time • Asset management is cross-cutting and does not easily fit within existing organizational structures	Agency leadership changes after elections can have a significant impact on programs that are not fully integrated into business processes In the absence of strong stewards among elected officials, there is little incentive from external stakeholders to use asset management	• Some guidance is available to identify improvement areas through the self-assessment and gap analysis tools	• There are few known financial incentives to motivate agency change
Leadership: **Leadership Support and Commitment**	• It is difficult to make the changes needed for asset management without leadership support • Historically, legislated requirements have not had the "teeth" necessary to motivate organizational change	• Priorities of elected and appointed officials often work against asset management programs • Many transportation agency directors serve at the pleasure of elected officials, which makes it difficult to enforce changes to existing investment processes	• There is a lack of executive-level metrics that communicate the need for, and the benefits of, preservation activities	• Transportation agencies facing constrained budgets are seeking ways of making more cost-effective investment decisions

Table 3. Contributing factors influencing each gap area (continued).

Gaps	Organizational Capacity	External Stakeholder Influence	Availability of Processes and Tools	Financial Management
Planning and Programming: **Funding Structure**	• Dedicated funding sources lead to management of assets individually rather than as a system • Traditional organizational structures to not easily lend themselves to cross-asset analysis • Historically, there has been no accountability for reaching agency goals within planning and programming functions	• Transportation agencies have not traditionally been held accountable for stated performance objectives • Unexpected events tend to divert funding away from sound, long-term goals	• The statewide transportation improvement program is managed on a project-by-project basis rather than a system optimization basis	• Dedicated funding sources prevent true optimization of investments • Future funding levels are extremely variable, making it difficult to conduct long-term planning
Data and Analysis: **Data and Systems**	• Leaders do not understand the value of improved data • Data governance issues have not been addressed to identify data sources, uses, and standards • Some people are hesitant to move forward without adequate data; yet obtaining adequate data can take years • Agency staff do not have the skills to be able to fully utilize existing management systems • Managing the system requires coordination with outside agencies, such as MPOs	• Elected officials and outside stakeholders seek improved methods of visualizing and communicating technical information	• Improved tools are needed to manage systems and to perform cross-asset utilization • Tools to predict the performance of assets other than pavements are not widely available • Many agencies have limited inventory and performance data on roadside assets, with the exception of pavements and bridges	• The lack of confidence in prediction models beyond 5 years makes long-term planning difficult
Data and Analysis: **Risk Management**	• The structured analysis of agency and program risks is not well understood or practiced • Guidance on conducting a formal assessment of agency risks is not available • Legislation provides a basis for a consistent approach to be followed for analyzing and managing risk	• Demand for an agency-wide assessment of risks has been absent • Unexpected events tend to shift funding away from sound, long-term goals	• There are not widely-available tools for conducting a formal risk assessment of agency and program risks	• Guidance for incorporating risk into long-term financial plans is not readily available
Data and Analysis: **Long-Term Financial Planning**	• Organizational changes are needed to focus on long-term, sustainable investments in the infrastructure • Concepts of long-term financial sustainability are not well understood in the United States • Future funding is difficult to predict, making it hard to confidently plan into the future	• Political influence on program decisions can negatively influence an agency's ability to optimize expenditures and achieve goals • In the United States, elected officials have not demonstrated an affinity for being held to long-term financial commitments • There are no consequences for poor stewardship	• Guidance in developing long-term, sustainable programs is not currently available • Existing systems may need increased sophistication to produce the information necessary for developing long-term, sustainable programs	• The links between the long-term financial plan and other operational plans is not well established

Short-Term and Long-Term Strategies to Address Gaps Identified by the TAM ETG

1. Focus short-term strategies on addressing the related to agency resources and leadership.

    a. Build and strengthen leadership support for asset management programs that consider risk and that reduce the overall life-cycle cost of managing assets.

    b. Improve the awareness, understanding, and knowledge of asset management at all levels of the organization.

    c. Assist organizations with the cultural, organization, and institutional changes that are needed to advance the use of asset management.

    d. Provide technical guidance and support in asset management so existing tools and data can be used fully and MAP-21 requirements can be met.

    e. Encourage the use of asset management beyond the requirements outlined in MAP-21.

2. Focus long-term strategies on advancing asset management maturity levels and building external support for asset management.

    a. Support the development of enhanced procedures and analysis tools that support cross-asset optimization, data integration, risk management, and long-term financial planning.

    b. Demonstrate the influence of asset management on improvements in agency transparency, accountability, and stewardship.

    c. Align national and state policies and standards with approaches that support the optimization of system performance.

Table 4. Focus areas over the next 10 years.

	Within the Next Two Years	Within the Next Five Years	Within the Next Ten Years
Focus Areas	• Implementation of MAP-21	• Expanded coverage of assets included in a TAMP • Guidance on: Data Governance & Integration, Long-Term Financial Planning, Risk, System Optimization, Maturity Assessments • Level 3 Performance Measures	• Expanded focus on Long-Term Financial Planning • Core maturity levels met in most states • Establish objective audit mechanism to ensure compliance with TAMP
Awareness Building Topics to Address to Achieve Desired Capabilities	• Asset Management • Developing a TAMP • MAP-21 Requirements • Communication Strategies • Risk Management • Data Integration	• Long-Term Financial Plans • Maturity Assessments • System Optimization • Advanced Communication Strategies	• TAMP Audit Mechanisms • Public support for asset management
Capacity Building Topics to Address to Achieve Desired Capabilities	• Developing a TAMP • Evaluating State TAMP Processes (FHWA Division Offices) • Aligning TAMP with agency long-range plans and processes	• CEO Stewardship Roles • Enterprise Risk Management • Data Governance and Integration using GIS • Maturity Assessments • System (e.g. Cross Asset) Optimization	• Long-Term Financial Planning • TAMP Audit Procedures • Level of Service Planning
Development of Guidance, Tools, and Templates to Achieve Desired Capabilities	• Data Collection and Management of Roadway Assets Other than Pavements and Bridges • TAMP Templates • Maturity Assessment Tools • Knowledge Portal	• Risk Management Guidelines • System Optimization Tools and Strategies • Data Governance Guidelines • New and Enhanced Performance Measures	• Financial Management Templates and Tools

Recommendations

- Start Immediately, Don't Wait for Rules
- High level Executive Champion
- Dedicate Someone Full Time
- Get copies of the Existing TAMPs
- Get a handle on your Data GAPs
  - Can you duplicate charts, graphs
- Develop your Risk Registers
- ## Start Immediately

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