

**MISSOURI**

state rail plan

TECHNICAL MEMORANDUM #4

# Rail Asset Management Business Plan

April 2012

Prepared for:



Missouri Department  
of Transportation

Prepared by:



## 1. Purpose of This Business Plan

Transportation and infrastructure are fundamental assets for economic growth. In the U.S., infrastructure and management represent a major portion of the government's spending.<sup>1</sup> However, there is a growing awareness that existing transportation infrastructure is built on antiquated growth and demand patterns, and are inadequate to meet future demands in the U.S. The American Association of State Highway and Transportation Officials (AASHTO) also reports that there is a growing reluctance to provide funding through formula programs and suggests reliance on a more substantive analysis of the infrastructure needs, which would affect not only the competitive environment within the transportation modes, but also across traditional modal funding. Therefore, Transportation Asset Management (TAM) becomes important to meet the future demands of a changing transportation environment.

Transportation asset management involves integrating management or business practices across organizations like the Missouri Department of Transportation (MoDOT) into a coherent system. It is important to note that while asset management is crucial to meet the future transportation demands and growth it cannot be generalized ("one size fits all") since the path to economic growth varies widely from one organization to another.

The objective of this report is to develop a **Rail Asset Management Business Plan** MoDOT can use as a blueprint to develop a rail asset management program and enhance MoDOT's current asset management practices.

The following approach will be utilized to accomplish this:

1. Evaluate Missouri's existing passenger and freight rail inventory data structure.
2. Identify best practices from *AASHTO's Transportation Asset Management Guide: A Focus on Implementation, January 2011*.
3. Analyze rail asset management plans developed by other states and their best practices.
4. Outline and implement a MoDOT Rail Asset Management Business Plan.

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<sup>1</sup> AASHTO Transportation Asset Management Guide: A Focus on Implementation, January 2011.

## 2. Missouri’s Existing Passenger and Freight Rail Inventory Data Structure

### 2.1. Missouri’s Rail Inventory Data Structure

MoDOT tracks several freight and passenger rail-related data within the state. It is worth noting that MoDOT does not own any rail assets, but makes investments to support rail infrastructure and operational developments in the state. **Table 1** lists various freight and passenger rail data tracked by MoDOT. The data has been further classified based on sustainability elements.

**Table 1: Freight and Passenger Rail Data Tracked by MoDOT**

Sustainability Element	Description
<b>Environmental</b>	Location of hazardous materials in the train, the cargo type, and the car type (1999 to 2003)
<b>Rail Related</b>	Changes near pedestrian crossings, including pedestrian crossing number, description of changes, date and historical information (1980 to 2011)
	Line segment, number of miles of line segment, county and city details, crossing number, crossing type, signal configuration, special warnings, train speed range, highway details, pavement details, circuitry installation year, etc.
	Industries that ship their products through Missouri’s railroads
	Data pertaining to rail line segment, including line segment number, starting mile marker, terminating mile marker, length of freight rail segment, length of passenger rail segment
	Changes in rail line segment data, including line segment number, date, description of change, old value
	Details of trains on the rail line segment, including rail line segment number, rail road involved, passenger train movements on the rail line segment, freight rail movements on the line segment, and million gross tons of freight moved on the line segment
<b>Economic</b>	Passenger rail data pertaining to origin and destination, ridership numbers, passenger miles, and ticket revenue
<b>Safety</b>	Accidents, including fatal or serious injuries, accident location, line segment details, etc. (1985 to 2011)
	Accidents, including location, railroads involved, accident cost, hazardous material involved, car details, etc. (1971 to 2011)
	Data includes rules not adhered to by railroads, including rule, sub-rule, description, etc.
	Accidents in Missouri from the federal database, including railroad involved, weather conditions, cars damaged, hazardous materials involved, train speed, train direction, location, description, etc.
	Accidents in Missouri from the federal database, including railroad involved, description, fatal injuries to employees, etc.

Source: MoDOT Rail database

## **2.2. Rail Sustainability Metrics**

Growing concerns about environmental quality, social equity, and economic vitality has led to a focus on sustainability and sustainable development. Transportation and land use in particular have been identified to play a role in establishing sustainable development patterns. Strategies for increased transportation sustainability include operations management, pricing, technology improvements, accessibility, asset management, transportation planning, stakeholder analysis, clean fuel, and alternative fuels, to name a few. These strategies in the past were sporadic due to complexities of the issues and uncertainties about the magnitude and timing of the impacts. New interest in this subject has led several researchers, practitioners, and transportation agencies to identify indicators and metrics to help them pursue these strategies and measure the impact on the environment, people, and economic stability of a region. It is also important to understand these strategies and policies cannot be generalized, as the uncertainties and variables surrounding a project or in a region may vary substantially from another. It is important to tailor these strategies to fit a region, agency, or a community, but at the same time adhere to the larger national goal of sustainable development.

With asset management principles and strategies being widely explored to understand life cycle benefits, it becomes important to measure and track various infrastructure elements and their impact on the bottom line elements of sustainability (environmental quality, social equity, and economic vitality).

As MoDOT explores the importance of rail for sustainable development of the state, it is important the department track elements to develop policies, investment strategies, and prioritize projects for infrastructure development. To accomplish this, performance indicators and metrics need to be identified to measure and track the bottom lines elements of sustainable development.

**Table 2** lists some of the performance indicators and metrics used to measure the benefits and the life cycle costs of rail assets in Missouri. The list may not be comprehensive, and should be used as a tool to develop similar strategies to track the impact of rail assets on various elements.

**Table 2: MoDOT Performance Indicators**

Sustainability Element	Rail Sustainability Indicators/ Metrics <sup>2</sup>	Data Collected by Other Entities	MoDOT Data Inventory
Economic	Capacity		X
	Government Policy and Subsidy	X	X
	Purchasing and Procurement		
	Asset Management		
	Regional Economic Development	X	
	Population Density	X	
	Pricing of External Costs/ Benefits to the Society		
	Employment	X	
	Economic Efficiency		
	Accessibility Measures		
	Growth Potential		
	Tax Revenues		
	Public Expenditure		
	Green GDP		
Total Rail Expenditure			
Rail Related	Length of Railways		X
	Parking Facilities		
	Passenger – Miles (by mode, purpose)		X
	Freight ton – Miles (by mode, purpose)		X
	Total Volume of Rail		X
	Public Transit		
	Signal Configuration		X
	Commute Cost		X
Commute Time		X	
Environmental	CO <sub>2</sub> Emissions		
	Green House Gas Emissions		
	Fossil Fuel Consumption		
	Waste/ Recycling		
	Land Use		
	Noise Level		
	Fuel Efficiency		
	Non-Fossil Fuel Use		
	Hazardous Materials Incidents		
	Overall Energy Efficiency for Passenger and Freight Rail Transport		

<sup>2</sup> Jeon, C., & Amekudzi, A. (2005). Addressing Sustainability in Transportation Systems: Definitions, Indicators, and Metrics. *Journal of Infrastructure Systems*, 11 (1), pages 31-50.

	Air Pollution Cost		
	Ecological Footprint		
	Percentage of reused or Recycled Parts		
	Investments Dedicated to Environmental Protection		
	Water Quality		
Safety Related	Deaths and Injuries		X
	Accidents		X
	Accident Cost		X
	Medical Costs Attributed to Rail		
	No. of Serious Pollution Cases or Health Effects		X
Social	Residential Population Exposed to Noise		
	Accessibility for Residents Without a Car		
	Avg. Walking Distance Between Residences and Public Services		
	Percentage Increase in Environmental Awareness (Surveys & Testing)		
	Quality of Transit (Mobility Impaired)		
	Crime		
	Quality of Pedestrian and Bicycle Environment		
	Affordability of Rail Transit (Various Income Groups)		
	Residents' Participation in Rail and Land-use Decision Making		X

### 2.3. MoDOT Asset Management<sup>3</sup>

MoDOT is the seventh largest state highway system in the country in terms of highway miles.<sup>4</sup> Missouri has an extensive rail network supporting both freight and passenger operations, ranking tenth nationally in the number of miles of track. Missouri also has a long history of Amtrak and state-supported intercity passenger rail service and is one of 13 states contracting with Amtrak for the operation of trains to supplement frequencies and/or extend service beyond the national system.

There are approximately 4,050 miles of freight railroad track within Missouri operated by 19 freight railroads, including six Class 1 railroads, eight switching and terminal railroads, and five local railroads.<sup>5</sup> There are 2,500 miles of yard track and about 7,000 public and private crossings in Missouri. Kansas City and St. Louis are ranked as the second and third largest rail hubs in the U.S., respectively, with more than 300 Kansas City freight arrivals and departures daily.

To effectively manage the assets of the state's highway system, MoDOT clearly defines policy and performance goals, uses performance measurement tools to monitor progress

<sup>3</sup> AASHTO Transportation Asset Management Guide: A Focus on Implementation, January 2011.

<sup>4</sup> AASHTO Transportation Asset Management Guide: A Focus on Implementation, January 2011.

<sup>5</sup> "Freight Railroads in Missouri," Association of American Railroads, 2011

toward those goals, and communicates results with external stakeholders and decision makers, as well as employees of the agency.

The agency’s performance measures are published regularly on the web through the MoDOT Tracker.<sup>6</sup> The outcomes of performance measures can be determined in several ways. **Table 3** lists the rail-related performance measures tracked by MoDOT.

**Table 3: Rail-Related Performance Measures from MoDOT’s Tracker**

Tracker ID	Performance Measure
12g	Number of rail passengers in Missouri
12g	Number of rail passengers on Missouri’s state sponsored trains
12h	State and Federal funding for multimodal programs
12i	Percentage of customers satisfied with transportation options
7e	Number of jobs and businesses in freight industry
7c	Impacts of job creation for government sector industries
7b	Economic return from transportation investments
11a	Freight tonnage by mode
13a-d	Customer involvement in transportation decision making
14e	Number of users of commuter parking lots
15i	Distribution of expenditure – Multimodal
16b	Number of engagements with Missouri’s congressional members, state wide elected officials, and legislators
16c	Number of transportation related legislative issues
16d	Number of proactive communication efforts initiated specifically to advocate for key transportation issues

Source: MoDOT Tracker

The performance measures recorded in Tracker are an integral part of MoDOT’s asset management system and are used in the management of virtually all aspects of the agency. Several conclusions can be drawn from MoDOT’s current asset management plan:

- Successful performance management requires active support and leadership from senior management
- Performance measures are important for transparency, accountability, and improvement
- Performance measures can improve the image of the agency with the public and stakeholders
- Performance measures can focus the efforts of the agency on priority outcomes, improving infrastructure, and services
- Adequate performance measures must be used to give a complete picture of performance
- Performance measures should be changed to meet changing conditions
- Performance measures must be used consistently to guide the daily direction of the agency

<sup>6</sup> MoDOT Tracker [http://www.modot.mo.gov/about/general\\_info/Tracker.htm](http://www.modot.mo.gov/about/general_info/Tracker.htm)

### 3. Benefits of a Rail Asset Management Plan

Successful implementation of a Transportation Asset Management Plan begins with good management, effective leadership, and achieving the right organizational structure. It does not happen overnight, and requires consistent direction, focus and attention over time. The *AASHTO Transportation Asset Management Guide*<sup>7</sup> describes the key tasks as a “step-by-step” sequence that an agency can use. When using the guide to implement TAM, all levels within the organization, from the executive through those involved in program delivery, should be involved.

Transportation Asset Management involves the collection and integration of multiple practices into a coherent and managed whole, the establishment of new approaches to asset management problems, and the linkage of business process to measures of the agency’s mission and goals. **Figure 1**<sup>8</sup> (adapted and modified) illustrates one such example where the asset management implementation framework consists of a collection of practices and business processes.

**Figure 1: Asset Management Implementation Framework**



<sup>7</sup> AASHTO Transportation Asset Management Guide: A Focus on Implementation, January 2011.

<sup>8</sup> Gilligan, J., Gaiger, S., Curry, A., & Rowe, B. (2007). Rail Safety and Standards Board: Foresight Studies in Sustainable Development. London, UK: Rail Safety and Standards Board.



An asset management plan can provide benefits to an agency by tying essential business processes to quantitative measures of performance. One of the key functions of asset management is to measure its own benefits in terms of performance consisting of the following benefits:

- Long-Term View
- Clear relationships, Transparency, and Accountability
- Desired Level of Service Provided
- Growth Plans
- Benefits of Infrastructure Maximized

### **Tangible Benefits of Asset Management**

Transportation systems throughout the country have experienced rapidly escalating costs due to factors such as inflation, environmental events and system growth. Funding shortfalls have increased the difficulties of meeting all of the state's transportation needs. Asset management programs can help states achieve greater benefits investing their limited resources. Asset management has also allowed facility levels of service to be better than they would have been without it. Asset management has helped states reduce the life-cycle costs of facilities by substituting preservation for "worst-first." The return on investment has increased significantly for bridges and pavements.<sup>9</sup>

#### **Purpose of Asset Management**

*The purpose of the asset management plan is to meet a required level of service, in the most cost effective manner, through the management of assets for present and future customers.*

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<sup>9</sup> AASHTO Transportation Asset Management Guide: A Focus on Implementation, January 2011.

## 4. Asset Management Best Practices

### 4.1. General Best Practices

AASHTO developed the transportation asset management guide to help enhance and integrate TAM thinking and culture within an organization like MoDOT. The goal is to help address long-term challenges of efficiency and cost-effectively managing an ever-growing and aging transportation asset base, preserving the investment made. Although the guide was written with a comprehensive transportation system in mind, this technical report focuses on the rail assets of the state.

Best management practices were identified through a literature review performed by Texas Transportation Institute.<sup>10</sup> The review included asset management concepts, current asset management practices and philosophies of other state departments of transportation (DOTs), the FHWA, and research efforts focused on right of way acquisition. The purpose was to ensure the Texas Department of Transportation and the research team will benefit from state-of-the-art concepts and practices for asset management.

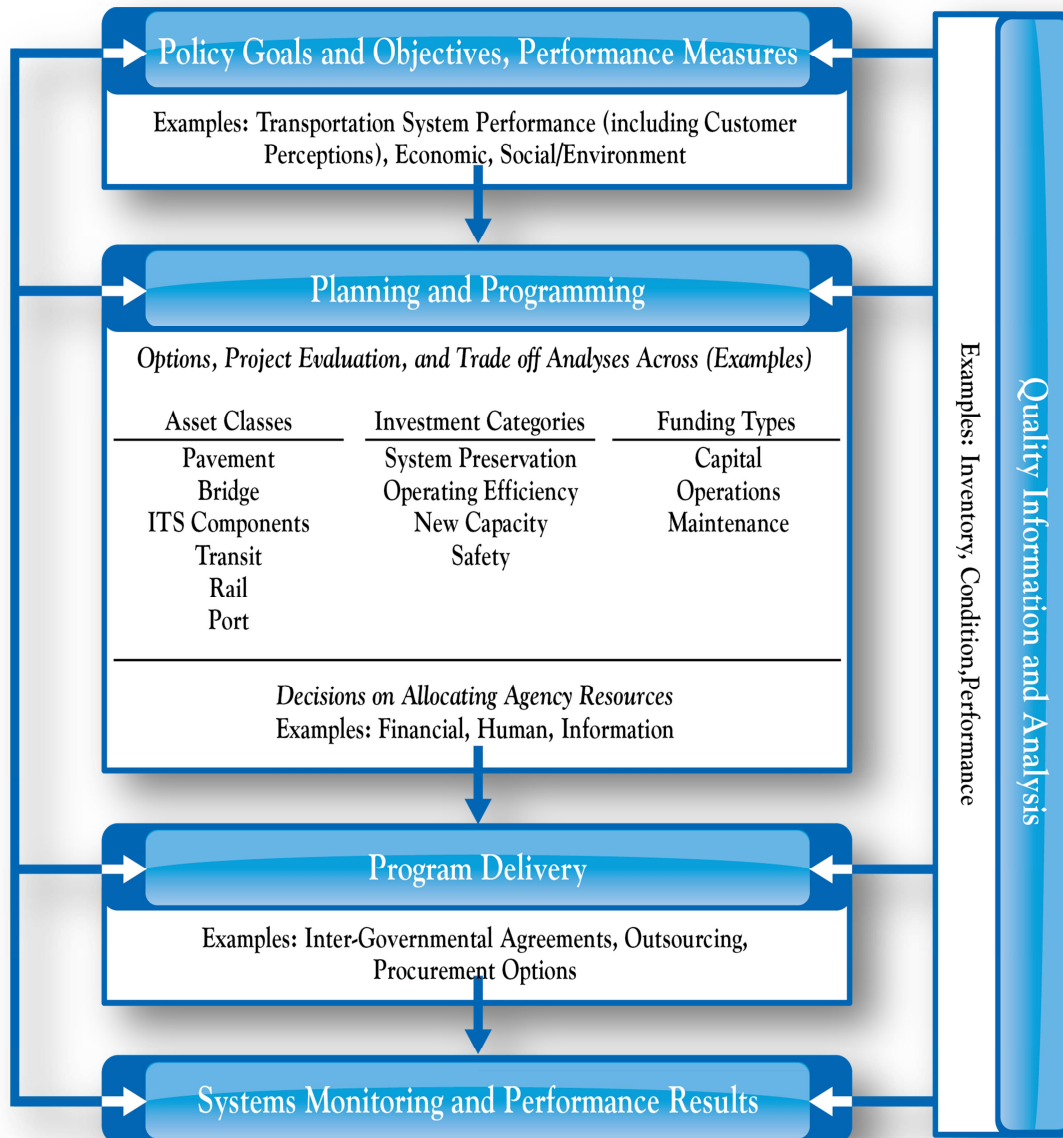
Asset management is an emerging effort to integrate finance, planning, engineering, personnel, and information management to assist agencies in managing assets cost-effectively.<sup>11</sup> The framework needed to carry out this process effectively encompasses an agency's policy goals and objectives, performance measurements, planning and programming, program delivery and system monitoring and performance results, as shown in **Figure 2**.

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<sup>10</sup> Texas Transportation Institute. Asset Management Literature Review and Potential Applications of Simulation, Optimization, and Decision Analysis Techniques for Right-of-Way and Transportation Planning and Programming, April 2007. <http://tti.tamu.edu/documents/0-5534-1.pdf>

<sup>11</sup> 21st Century Asset Management. Washington, D.C., American Association of State Highway and Transportation Officials, 1997.

Figure 2: Resource Allocation and Utilization Process in Asset Management



Source: AASHTO, 2002

Asset management best practices were identified through a literature review conducted by the Texas Transportation Institute.<sup>12</sup> Core principles, concepts, applications, tools, and practices presented in this selection set the framework for the development and implementation of asset management.

<sup>12</sup> Texas Transportation Institute. Asset Management Literature Review and Potential Applications of Simulation, Optimization, and Decision Analysis Techniques for Right of Way and Transportation Planning and Programming. April 2007. <http://tti.tamu.edu/documents/0-5534-1.pdf>

Primary topics include:

- Comprehensive guidance on asset management implementation concepts and principles
- Asset Management Primer
- Analytical Tools needed in trade-off decisions for resource allocation
- Tools based on experiences and best practices from Florida, Maryland, Michigan, Montana and Pennsylvania
- Performance measures
- TAM Economic Trade-Off Model
- Top-down and bottom-up approaches to asset management data integration

These asset management best practices provide the foundation from which state departments of transportation's asset management plans have been developed. The following section looks at three case studies and the lessons learned from each.

## **4.2. Asset Management Examples from Other States**

### **4.2.1. Washington State Rail Asset Management Plan**

The *Washington State Rail Asset Management Plan*<sup>13</sup> was developed to provide value and performance objectives that are not merely financial considerations of the state, but also provide an insight on the public benefits generated through effective use of assets. Specific objectives of the Washington State rail asset management plan include:

- Evaluating the state's existing rail passenger and freight programs, with particular attention paid to the short-line program
- Comparing the state's approach with that of other states
- Identifying strategies for management of rail assets and investment in rail infrastructure
- Developing specific strategic direction for short-line program, including vision, mission, and goals based on strategic alternatives and direction of the Commission
- Providing a business-based approach to financial sustainability and monitoring the state's rail program that could be applied specifically for short-line assets

### **Asset Management Plan**

The plan recommends the Washington State Department of Transportation (WSDOT) develop a framework for managing rail freight assets. The state owns and manages three types of assets:

1. Locomotives and maintenance equipment
2. Grain cars
3. Rail lines

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<sup>13</sup> Cambridge Systematics, Inc. and HDR, Inc. (2006). *Statewide Rail Capacity and System Needs Study: Asset Management*. Washington State Transportation Commission.

For each asset category, the plan includes the following:

- Goals
- The decision framework for purchase and disposal of assets
- Contracting requirements for leasing assets or other mechanism to make them available to public or private parties
- Inventory requirements
- Performance measures

### **Summary**

The management of rail assets will benefit WSDOT from detailed attention and careful record keeping of all the state's rail assets. The asset management plan should clearly state the purpose of the rail infrastructure, as well as the system goals and objectives over each section. This ensures that performance measures and standards are assigned to each asset, and enables easier monitoring of the system assets. The monitoring of assets should occur regularly and those that are not performing to assigned standards should be monitored carefully and required corrective action should be performed.

Acquisition of rail assets may benefit by governance at a local level, as opposed to the state level and these acquisitions should be considered only if there is a financial commitment on the part of both the state and the users of the infrastructure. The state should contribute financially if the public benefits outweigh the expenditure of funds.

#### **4.2.2. New York State's Asset Management Plan<sup>14</sup>**

The New York State Department of Transportation (NYSDOT) discussion surrounding asset management focuses on databases, asset inventories, technical models, and other analytic tools. The uniqueness of New York's program update process lies in developing a formal and structured approach dependent on project priorities and the establishment of programs to be funded over a defined period of time. This has been modified over the decade, but has provided the agency a framework for department's efforts to develop and manage a multiyear program, including difficult modal trade-offs. This enables NYSDOT to compare and contrast different strategies through the use of agreed performance measures to evaluate completed work.

The asset plan is initiated through the following actions to each of the 11 NYSDOT regions. The main purposes of the update include:

- Establish statewide goals, derived from the current condition of NYDOT's major assets for bridges, pavements, safety, and mobility programs
- Provide each region with annual and 12-year allocations of all known federal and state funds for maintenance and capital programs
- Give each region directions on specific areas that should receive emphasis as it develops its programs

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<sup>14</sup> Clash, T., & Delaney, J. (2000). New York State's Approach to Asset Management: A Case Study. *Transportation Research Record* (1729), pages 35-41.

The areas included preventive maintenance, economic development, at-grade rail crossings, bicycle and pedestrian needs, and others with regular changes.

The NYSDOT recognizes as the requirements for accountability both inside and outside of the government grow, and the resources available for the state's complex transportation network are limited, the need for constantly improving the asset management system is important. The NYSDOT continues to work actively with AASHTO Asset Management Task Force and the National Cooperative Highway Research Program (NCHRP) on efforts to identify the most effective actions for building an asset management system.

The state's experience over the past decade may assist in identifying the truly important elements of asset management. Implementation of asset management should start with the development of technical modeling and other analytic tools that simply talk to each other is a common conclusion DOTs leap towards. NYSDOT instead has learned the hard way organizational and business foundations and disciplined decision-making are far more crucial to achieve the capabilities an asset management system can provide. The tools (sophisticated models and complex infrastructure management systems) are important, but transportation professionals should not be under the illusion technical solutions alone are sufficient for implementing asset management.

#### **4.2.3. Colorado State Asset Management Plan<sup>15</sup>**

The Colorado Department of Transportation (CDOT) is responsible for the state's transportation system, which includes roadways, rail corridors, transit services, bicycle and pedestrian ways, and commercial and general aviation. Like other DOTs, CDOT is balancing an aging system in need of extensive repair. Further funding shortfalls have increased the difficulties of meeting all the state's transportation needs. In order to meet these challenges, CDOT has embarked in an asset management journey since the 1990s.

CDOT's commitment to asset management began with defining investment categories, associated performance measures, and relevant data. The investment categories are:

- Safety
- System Quality
- Mobility
- Program Delivery

These categories allow agencies to develop an asset management framework relating to investments of policy objectives and impacts rather than funding sources. This framework includes:

- Updated Planning and Prioritization Process
- Integration Levels of Service
- Customer Surveys

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<sup>15</sup> AASHTO Transportation Asset Management Guide: A Focus on Implementation, January 2011.

- Guidance for Improving Technology Infrastructure

### **Planning and Programming**

CDOT's estimates in both the planning and programming process are as accurate as possible and most are tied to current dollar value to reduce the problem of estimating inflation. One of the goals in the planning process relates to maintenance service levels, which are defined and predicted by a maintenance management system.

### **Information and Analysis**

CDOT's asset management system allows the agency to measure and analyze standards, performance, and levels of service. It also provides enhanced opportunities for trade-off analyses, promotes objectivity in resource allocation, and promotes better communication across the department and with the public and stakeholders. The investment-planning group is responsible for measuring and reporting performance measures and analyzes policies in support of the long-range transportation plan.

### **Lessons Learned**

Gaining internal support and participation and achieving meaningful understanding from external stakeholders are two major challenges in implementing an asset management program. In order to counter these problems, CDOT suggests:

- Understanding the agency's governance structure before initiating change
- Tailoring applications to specific situations and problems
- Involving data owners early in the process to build support and understanding
- Using the investment category analysis approach to facilitate staff understanding of how individual decisions affect final outcomes
- Having the support of upper management is necessary for success
- Ensuring mid-level managers and staff accept the program for it to be successful

### **4.3. Summary of Best Practices from Other States**

A study of various asset management programs in the U.S., and analyses of the frameworks revealed it is important to evaluate the state's existing passenger and freight rail programs, and detailed attention must be paid to develop short line programs to cater to the needs of numerous small businesses around the state that lack transportation options. In order to achieve these results it is important to establish statewide goals, develop specific strategic direction, and provide a business-based approach for financial stability and identifying alternatives for investment in rail infrastructure. Detailed attention and careful record keeping is essential and should occur regularly, enabling easier monitoring of system assets and performance measurements. Assets not performing to assigned standards should be monitored carefully and corrective actions should be taken immediately to adhere to the goals and objectives.

It is also important that each region in the state is provided with allocations of federal and state funds for maintenance and capital programs, and must be given directions on areas such as economic development, pedestrian and bicycle needs, rail crossings, preventive maintenance, etc. Acquisition of rail assets may be beneficial if governed at a local level, as opposed to the state level. These acquisitions should only be considered if there is a financial commitment on the part of both the state and the users of the infrastructure. It is also important for the state to contribute financially if the public benefits outweigh the expenditure of funds.

Even though asset management programs have numerous benefits, gaining internal support and participation and meaningful understanding from external stakeholders seem to be major challenges in implementing. Understanding the agency's governance structure, tailoring applications specific to the situation and problems, involving data owners early in the process, using an investment category analysis approach, and gaining support from upper management and acceptance from mid-level managers and staff can counter these problems and are essential to success.

## 5. MoDOT Rail Asset Management Blueprint

### 5.1 MoDOT's Business Plan

MoDOT's transportation system has experienced escalating costs, due to factors such as inflation along with limited resources. Funding shortfalls have increased the difficulties of meeting all the state's transportation needs. An asset management program can help MoDOT achieve greater statewide benefits investing their limited resources.

MoDOT currently has a comprehensive performance measurement system called Tracker. However, as discussed, there is a lot more to an asset management plan than performance measure tracking. A rail asset management plan should be structured to capture:

- A sustainable system
- Long-term view
- Clear relationships, transparency, and accountability
- desired level of service
- Plans for growth
- Maximum benefits of infrastructure

A rail asset management program should be implemented to maximize the state's rail benefits. One way to develop an asset management program is through a secure, web-based application accessible via the Internet for all MoDOT Rail Section staff who manage, collect and use rail information. An example of a web-based rail asset management program is **RailAdvise™**.

RailAdvise streamlines railroad companies' compliance with new Federal Railroad Administration (FRA) regulations requiring adoption of bridge management plans. More than just a database for asset management and prioritization, RailAdvise enables mobile, device-agnostic inspections and real-time data delivery back to the track owner's system. The scalable software, which is fully customizable to FRA regulations, uses condition and



structural ratings, as well as other client-specific risk factors, to assign a specific priority to each bridge. By prioritizing bridges that need repairs or replacement, RailAdvise will give clients significant advantages in planning for future funding needs. RailAdvise also integrates geo-spatial technologies, so railroads can improve track inspectors' efficiency and create metrics to better manage projects. The cloud-based application also reduces clients' overhead costs.

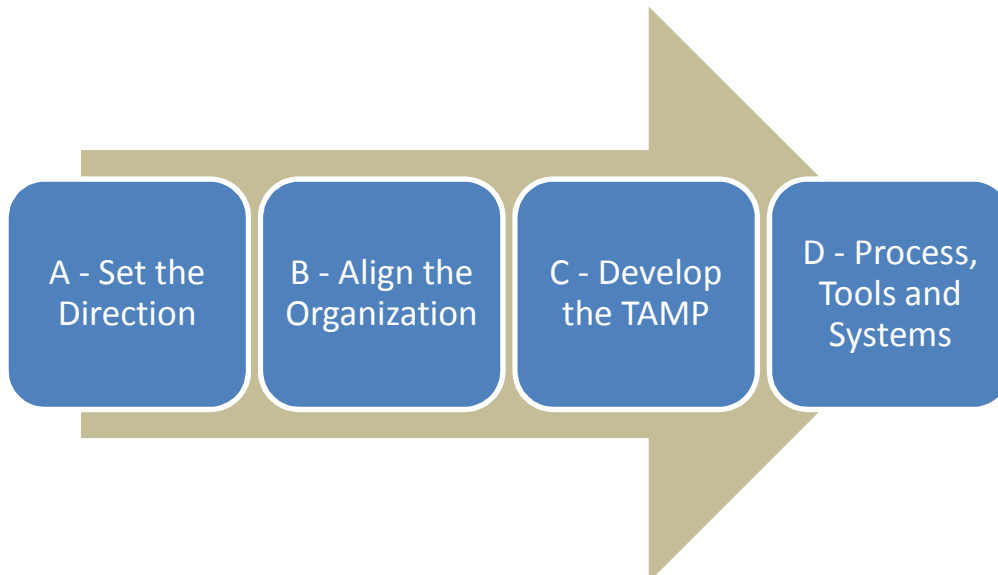
## 5.2 Implementation Plan

The implementation plan is based on Missouri's existing rail inventory, MoDOT's current asset management, benefits and best management practices of a rail asset management plan described in AASHTO's *Transportation Asset Management Guide*. The transportation implementation plan should address five core questions:

1. What is the current state of assets?
2. What are the required levels of service and performance delivery?
3. Which assets are key to sustained performance delivery?
4. What are best investment strategies for operations, maintenance, replacements and improvement?
5. What is the best long-term funding strategy?

**Figure 3** shows the overarching TAM implementation steps. Within each of these steps is a number of sub-steps comprising the overall implementation approach. The asset management improvement program is a process-oriented approach where each step of the process must be well implemented before proceeding to the next. The path to a successful and well-implemented asset management practice will differ from one agency to another based on the agency's history, current practices, responsibilities, constraints, and organizational environment.

**Figure 3: Transportation Asset Management Plan Implementation Steps**



Source: AASHTO's *Transportation Asset Management Guide*

Each of these four implementation steps (5.2.1 through 5.2.4) has sub-steps (1 through 14) described below.

### **5.2.1. A – Set the Direction**

*Step 1 – Set agency goals and objectives*

*Step 2 – Perform an agency self-assessment and TAM gap analysis*

*Step 3 – Define the scope of TAM in your agency*

The initial step of a MoDOT rail asset management plan involves reviewing the organizational strategy and establishing asset management goals and objectives like any other task. These strategic initiatives must align with MoDOT's overall mission, business strategy, and desired outcomes.<sup>16</sup> The goals and objectives should also include public stakeholders and not merely adhere to the organizational environment. Thereby, enabling cross-functional organizational involvement will strengthen the TAM effort.

Determining MoDOT's current position across the organization helps in comparing the existing organizational practices to the desired long-range strategic plan. Tools such as a self-assessment and gap analysis help in identifying and prioritizing weak areas in need of improvement. This is accomplished within the state rail plan also. These steps help in scoping specific actions for improving existing conditions and developing a management framework which links transportation asset management to organizational commitment.

Developing such a high level system understanding at a very early stage in the asset management implementation process provides clear direction and ensures buy-in across the organization. This also provides an opportunity to communicate to both management and staff the organization's intentions for the transportation asset management process. Further, setting the direction initially identifies key areas towards what the organization wants to achieve with asset management, its benefit to the organization, and changes to the organization, if any.

### **5.2.2. Align the Organization**

*Step 4 – Develop the change strategy*

*Step 5 – Integrate TAM into the organizational structure*

*Step 6 – Integrate TAM into business process*

*Step 7 – Establish asset management roles*

*Step 8 – Establish performance management standards*

Transportation asset management ensures an agency-wide understanding of the objectives and performance measures, an approach to building and accomplishing the

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<sup>16</sup> AASHTO Transportation Asset Management Guide: A Focus on Implementation, January 2011.

agency's mission. An essential step in this process is to build cohesion amongst various units of the organization, such as MoDOT's Multimodal Operations Division or the division's Railroad Section, and bring them on-board to move towards process and performance goals as a team. Organizational strategies and changes and performance measurement tools can assist in bringing the team together. Management must set the direction based on previous steps and create a culture that supports asset management and staff must support management's efforts with information, analysis, and implementation.

### **5.2.3. Develop the Transportation Asset Management Plan**

#### *Step 9 – Develop a TAM Plan*

A TAM Plan is a tactical process focusing on analysis, alternate process development, programs, delivery mechanisms, and reporting mechanisms to ensure a successful strategic objectives implementation. Information about assets, their management strategies, long-term expenditure forecasts, and business management processes are inherent to the asset management plan. The plan formalizes and documents key information including:<sup>17</sup>

- The strategic outcomes or objectives it supports
- The services the agency delivers now and in the future and why they are delivered
- The nature of the assets required to deliver the services and their current condition and performance in a form relevant to assessing the achievement of the agency mission
- Planned asset improvements and capacity expansion in response to future demand, risk, and other trends
- How the assets will be cost-effectively managed throughout their life cycles
- Long-term financial forecasts, thus informing program development and budget cycles
- Planned improvements in asset management business processes, goals and requirements for resource availability and productivity, and desired future performance resulting from implementation of the plan

Developing a written plan accelerates the process and reduces some of the communication problems that come with organizational changes. The written plan also assures senior management is committed and supports the change. The plan will be owned by the organization and not by a particular division or group. The plan should include the services and responsibilities of MoDOT for delivering results to its customers, and how it plans to utilize and manage the assets under its control to achieve this. The plan needs to be reviewed and updated regularly. The time period should be anywhere from a year to three years so the plan remains current and relevant.<sup>18</sup>

There is no specific structure for a Transportation Asset Management Plan as it depends entirely on how the agency plans to utilize the document. But having a standard

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<sup>17</sup> AASHTO Transportation Asset Management Guide: A Focus on Implementation, January 2011.

<sup>18</sup> AASHTO Transportation Asset Management Guide: A Focus on Implementation, January 2011.

structure enables quality and repeatability, which helps in auditing, review process, and benchmarking sections. **Table 4** recommends a structure that can change based on the availability of data and ultimately on the purpose of the document. The structure also suggests in addition to a transportation asset management improvement path, the agency should focus on financial programs and needs. These financial programs should be robust and short-term (three year periods) indicative for the medium term (three to ten years), and linked to expected life cycles of each asset group.<sup>19</sup>

**Table 4: Transportation Asset Management Outline**

Recommended Outline	Other Potential Topics / Sections
Executive Summary 1.0 Introduction 2.0 Levels of Service 3.0 Life Cycle Management 4.0 Growth and Demand 5.0 Financial Summary 6.0 TAM Practices 7.0 Implementation Plan Appendices	<ul style="list-style-type: none"> <li>• Services Provided</li> <li>• Assets Owned</li> <li>• Environment</li> <li>• Managing the Assets</li> <li>• Risk Management</li> <li>• Monitoring, Review and Continual Improvement</li> </ul>

Source: AASHTO Transportation Asset Management Guide, 2011

#### **5.2.4. Process, Tools and Systems**

*Step 10 – Service Planning*

*Step 11 – Life Cycle Management*

*Step 12 – TAM Integration*

*Step 13 – Information Systems*

*Step 14 – Data Collection and Management*

An agency should advance in its asset management maturity. This maturity relies heavily on comprehensive and reliable knowledge of what assets are owned, how they are performing and being managed, and how the actions of the agency are likely to affect the performance. This involves routine collection of data and transforming it into useful and actionable information. While data plays an important role in achieving asset management maturity, it is often seen to create problems that hinder growth. The persistence and discipline of organizations to prevent sharing and integrating the data impedes comprehensive trade-off analysis, thereby making it difficult to use asset management information for prioritizing and allocating resources. Although the use of technology may seem to be a logical solution, the problem is not primarily a technical

<sup>19</sup> AASHTO Transportation Asset Management Guide: A Focus on Implementation, January 2011.

one and several non-technical solutions are available for implementation. However, cross-functional integration techniques are necessary for successful data management.

The data gathered helps measure information on a wide range of outcomes, such as condition, safety, mobility, and risk. The agency can report on several performance measures such as output costs, effectiveness, utilization, etc., but reporting appropriate performance measures tied to agency goals and strategies is essential. Linking performance measures with a specific level of service helps identify sources of risk, evaluate them, and develop steps to mitigate them.