Transportation Asset Management

A Framework for Successful Performance-Based Planning

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Perspectives on TAM

Transportation Asset Management is 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.

(NCHRP Report 632)

...the business of infrastructure ...
The importance of infrastructure

• Infrastructure underpins national economies and supports lifestyles

• It’s often taken for granted by the community until it fails

• It represents a major investment by communities progressively built up over a long period

• It provides a platform for economic growth and social development
TAM principles are intended to stimulate strategic thinking about transportation infrastructure

- What do we want to accomplish, and why?
- Do we need to change the current business model to achieve these objectives?
- What resources are available to succeed in this mission?
- How do we measure success?
TAM Business Model – Five Core Questions

• What is the current state of my assets?
• What are my required levels of service and performance delivery?
• Which assets are critical to sustained performance delivery?
• What are my best investment strategies for operations, maintenance, replacements and improvement?
• What is my best long-term funding strategy?
TAM is not a part of the business, it is the business
Why Transportation Asset Management?

1. Provides a key link to performance management
2. Improves service levels
3. Documents agency approach to addressing needs
4. Helps explain why funds are needed and provides accountability for effective use of funds
1. Link to performance management

*Purpose of asset management:* To meet a required level of service, in the most cost effective manner, through the management of assets for present and future customers.

(International Infrastructure Management Manual, NAMS, 2006)
Today’s Challenges

- Growing Travel Volume and Congestion
- Increasing Use of Technology to Solve Problems
- Aging Infrastructure Networks
- Limited Financial Resources
- Growing Pressure Nationally and Locally for Performance and Accountability
TAM will assist agencies meet the challenges

- Greater accountability to the public and funding agencies.
- Maximizing use of resources within a highly constrained funding environment.
- Linking investment levels to infrastructure condition and transportation system performance.
- Preserving assets and improving safety in the face of growing impacts and costs of asset deterioration.
- Public expectations for more sustainable transportation solutions.
## Evolution of TAM in the US

### 1980's
- Pavement Management Systems used in some agencies
- A few custom bridge management systems in place
- Initiation of Pontis BMS effort by FHWA
- Program management approaches used by a few agencies

### 1990's
- AM Guide Vol. 1 project initiated
- ISTEA, federal transportation authorization requires six management systems
- Many agencies initiate management system efforts – most with limited success
- FHWA creates Office of AM, AASHTO creates subcommittee on AM
- Interest in AM grows in state DOTs as they face growing needs and limited resources

### 2000's
- Performance management growing in importance – federal reauthorization, AASHTO SCOPM
- AM Guide Vol. 2 project initiated
- ERP implemented with TAM integrated or at least architected
- Greater use of AM principles in everyday DOT activities – policy link to decisions, PMs, data mgt
- Greater use of pavement and bridge management systems in state DOTs
Surface Transportation Authorization Act is coming

- Achieve national objectives
- Establish local transportation plans
- Improve project delivery
- Greater transparency, accountability, oversight, and performance measures
TAM is a resource for responding

• Clear federal role and national objectives
• Consolidate and simplify programs
• Performance standards and accountability measures
• Expand mobility and access for people and goods
• Improve liveability and environmental sustainability of communities
• Improve efficiency of federal programs and delivery of projects
2. Improves service levels
TAM shows how to link outcomes to levels of service

- A “bumpy road”?  
- What mix do our customers want?  
- What are they willing to pay for?  
- What do we need to deliver to achieve them?  
- How long will it take?
## Some LOS examples

<table>
<thead>
<tr>
<th>Customer Level of Service</th>
<th>Link to Customer Outcomes</th>
<th>Technical Identifier</th>
<th>Technical Levels of Service</th>
<th>Performance Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Highways will:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide appropriate bridge side protection including approaches.</td>
<td>CV 3.1 Safety</td>
<td>Crash hazard protection</td>
<td>Compliant barriers on all bridge approaches and bridges and at other locations as detailed in the SH SMS Manual Edition 4 - March 2007 section 6.4 Barriers</td>
<td>Reducing trend in crashes where inadequate protection was a factor Side protection – number of non-compliant bridges, bridge approaches and other sites</td>
</tr>
<tr>
<td>Have at least two lanes and be two way in all but the most exceptional circumstances</td>
<td>CV 1.2 Journey time CV 1.3 Carrying more freight CV 3.1 Safety</td>
<td>Bridge width</td>
<td>Two-lane two-way unless: Multi-lane approach AADT &lt;1000 and two-lane bridge is uneconomic</td>
<td>Number of single lane two-way bridges. Target compliance level to be confirmed.</td>
</tr>
</tbody>
</table>
### Some more LOS examples

<table>
<thead>
<tr>
<th>Customer Level of Service</th>
<th>Link to Customer Outcomes</th>
<th>Technical Identifier</th>
<th>Technical Levels of Service</th>
<th>Performance Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Highways will:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not have water ponding on the road making it unsafe for road users after rain</td>
<td>CV 3.1 Safety</td>
<td>Rutting</td>
<td>Rut depth &lt;=20mm</td>
<td>99% of network with rut depth less than 20mm</td>
</tr>
<tr>
<td>Have marked centre-lines, edge-lines, no-passing lines, edge marker posts and reflective raised pavement markers.</td>
<td>CV 3.1 Safety</td>
<td>Delineation</td>
<td>Comply with Manual Of Traffic Signs and Markings, Traffic Control Devices Manual, and NZTA Specifications</td>
<td>100% compliance with MOTSAM, TCDM, and NZTA Specs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Install audio-tactile profile markings where justified</td>
<td>% of highway carriageway-sections with deficient delineation. Target for profile markings to be developed</td>
</tr>
</tbody>
</table>
Customer research a starting point for levels of service

Customer Research

Customer Values  Legislative Standards  Strategic Drivers

Levels of Service (Demand for quality, quantity etc)

Assess affordability and funding options

Ongoing review and management of asset performance and realization of value delivered

Assess Life Cycle
Asset management
Solutions to deliver value propositions

Current resource capability

Required resource availability and technology

Asset improvement
Operate & maintain
Replace / refurbish
Dispose
Non-asset solutions
3. Documents agency approach to addressing needs, &
4. Helps explain why funds are needed and provides accountability for effective use of funds
TAM covers a wide portfolio of assets

- Pavements
- Bridges
- Tunnels
- Other structures such as retaining walls, culverts, sign structures, etc
- Curbs, channels, dams, and drainage facilities
- Barriers, railings, and medians
- Road signs
- Pavement markings
- Traffic signals and control equipment
- Intelligent transportation systems (ITS)
- Street lighting
- Sidewalks
- Bicycle lanes and paths on the right of way
- Parking facilities such as pay and display machines, parking meters
- Rest areas
- Maintenance buildings and equipment
- Landscaping
TAM shows how to tie funding to performance based outcomes

• TAM helps move away from formula based funding allocation to performance based outcomes

• TAM ties performance based levels of service to agency objectives
  – Define performance outcomes
  – Set LOS
  – Make program decisions
  – Optimize use of funds to achieve performance objectives

• Measurable outcomes that can be tied to the delivery of annual plans and programs
TAM describes economic principles

- TAM recognizes the economic value of assets, economic consumption over time and intergenerational equity considerations.

- TAM targets economic efficiency using economic analysis techniques to optimize asset expenditure over the asset’s lifecycle.

- The agency plays a long-term role as “steward” of the assets.
Financial stewardship: understanding the economic value of your assets
Minimize life cycle costs? Yes, but ….

**Definition:** To provide a desired *level of service in the most cost effective manner for present and future customers*

So we can’t minimize our whole of life costs until we know what service we are delivering. No service at all would give us the lowest costs!!
Example: Scenario based approach to program development

Low expenditure: reduce operational and asset preservation costs
- Risk exposure may increase, but safety must not be compromised.
- Some LOS cuts acceptable, but no legislative requirements compromised.
- Asset condition may deteriorate.
- May result in deferred liabilities and increased whole of life costs.

Medium expenditure: hold to current levels, with trade-offs
- No increase in risk.
- Typically, levels of service retained.
- Some asset deterioration may occur, but aiming to hold whole of life costs.

High expenditure: an expansion from current
- Risk exposures reduced, safety enhanced.
- Customer satisfaction and LOS improve.
- Improved asset condition, whole of life cycle costs optimized in all areas.
TAM shows how to realize the benefits

• TAM enables better use of existing funds – by better quantifying current and future performance and optimizing the agency’s decisions.

• TAM improves agency competitiveness for limited funds – by improving the agency’s credibility, and its knowledge of the long term needs of assets.

• TAM helps build constructive political relationships – by providing hard information that can be readily understood.
The TAMP is an accountability mechanism – linking strategy to performance measurement and program delivery
TAM at the LADOTD

• LADOTD has many mature TAM Systems
  Bridge Management System
  Pavement Management System
  Highway Priority Program
  Strategic Plan
  Others

• First step towards agency-wide TAM will be to create an TAM steering committee composed of representatives from across the LADOTD. Goal is to have this committee in place by the 2\textsuperscript{nd} quarter of 2011.

• LADOTD will utilize the AASHTO Asset Management Guide – A Focus on Implementation to move towards transportation asset management.
AASHTO TAM Guide Volumes 1 and 2 are interlinked
How can the AASHTO TAM Guide be used?

• As a modular, resource document
• As a sequence of implementation steps
• For knowledge transfer and bridging the gaps
TAM Guide 2 road map – 14 steps to implementation …
... plus case studies
TAM Resources Are Available

AASHTO Asset Management Subcommittee
http://www.transportation.org/?siteid=95

Asset Management Today website / community of practice:
http://assetmanagement.transportation.org

AASHTO Asset Management Guide Volume 1
http://downloads.transportation.org/amguide.pdf

AASHTO Asset Management Guide Volume 2 (draft):
http://planning.transportation.org/Pages/Publications.aspx

FHWA Office of Asset Management:
http://www.fhwa.dot.gov/infrastructure/asstmgmt/index.cfm

TRB Asset Management Committee
http://144.171.11.40/cmsfeed/comm_detail.asp?id=3038