NCHRP 08-36 TASK 114

Transportation Asset Management for Ancillary Assets

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Overview

• Project Approach
  – Project Tasks
• Asset Classification Hierarchy
  – Assets Selected for Focus
• State-of-the-Practice
• Life Cycle Management Principles
• Integrating Ancillary Assets into Enterprise Asset Management Systems
• Results
  – Sample guidance template for High Mast Light Poles
• Next steps
Project Approach

• Provide information to serve as a starting point to approach asset management for ancillary assets
  – Classification hierarchy for ancillary assets
  – Identification of how the life cycle management of ancillary assets can be incorporated into enterprise asset management systems
  – State-of-the-practice for asset management of a subset of ancillary assets
  – Recommended life cycle management business processes for the subset of ancillary assets
Project Tasks

**Task 1: Project Kickoff**
Meet with project panel

**Task 2: Develop Classification Hierarchy for Ancillary Assets**
Review prior NCHRP studies
Assess prior frameworks and develop standard hierarchy

**Task 3: Document Ancillary Asset Lifecycle Management Practices**
Select volunteer DOTs for surveys
Analyze state of practice

**Task 4: Identify Best Practices**
Use survey results, prior research, and the team's knowledge to identify best practices

**Task 5: Final Report**
Analyze results of survey
Compare best practices and state-of-the-practice
Identify linkages with asset management systems
## Asset Classification Hierarchy

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Asset Elements</th>
<th>Asset Sub-Elements (if Applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structures (not bridges or otherwise in the national bridge inventory)</td>
<td>Drainage Structures</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Overhead Sign and Signal Structures</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Retaining walls  (Earth retaining structures)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Noise barriers</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>High Mast Light Poles</strong></td>
<td></td>
</tr>
<tr>
<td>Traffic Control &amp; Management – Active Devices</td>
<td>Signals</td>
<td>Signals, beacons, flashers, ramp meters</td>
</tr>
<tr>
<td></td>
<td><strong>ITS Equipment</strong></td>
<td>Cameras, variable message signs, detection devices/sensors, highway advisory radios</td>
</tr>
<tr>
<td></td>
<td><strong>Network Backbone</strong></td>
<td>Hubs and nodes, fiber, cabinets, software</td>
</tr>
</tbody>
</table>
### Asset Classification Hierarchy

#### Asset Class

<table>
<thead>
<tr>
<th>Traffic Control &amp; Management – Passive Control Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset Elements</td>
</tr>
<tr>
<td>Signs</td>
</tr>
<tr>
<td>Barrier Systems</td>
</tr>
</tbody>
</table>

#### Asset Sub-Elements (if Applicable)

<table>
<thead>
<tr>
<th>Traffic Control &amp; Management – Passive Control Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset Sub-Elements (if Applicable)</td>
</tr>
<tr>
<td>Regulatory and warning signs</td>
</tr>
<tr>
<td>Guide, service and attraction signs</td>
</tr>
<tr>
<td>Guardrails, barrier walls, cable barriers, end treatments, impact attenuators</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drainage Systems and Environmental Mitigation Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset Elements</td>
</tr>
<tr>
<td>Drain Inlets and Outlets</td>
</tr>
<tr>
<td>Culverts (&lt; 20 ft)/Pipes</td>
</tr>
<tr>
<td>Ditches</td>
</tr>
<tr>
<td>Environmental Mitigation Features (Storm Water Retention Systems)</td>
</tr>
<tr>
<td>Other Drains</td>
</tr>
</tbody>
</table>

#### Other Safety Features

<table>
<thead>
<tr>
<th>Other Safety Features</th>
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</thead>
<tbody>
<tr>
<td>Asset Elements</td>
</tr>
<tr>
<td>Lighting</td>
</tr>
</tbody>
</table>

#### Roadside Features

<table>
<thead>
<tr>
<th>Roadside Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset Elements</td>
</tr>
<tr>
<td>Sidewalks</td>
</tr>
<tr>
<td>Curbs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Roadside Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset Sub-Elements</td>
</tr>
<tr>
<td>ADA ramps</td>
</tr>
</tbody>
</table>
Ancillary Assets Selected for Further Focus

- Culverts (<20 ft.)/Pipes
- Drainage Systems and Environmental Mitigation Features
  - Drain Inlets/Outlets; Ditches; Storm Water Retention Systems; Other Drains
- Overhead Sign and Signal Structures
- High Mast Light Poles
- ITS Equipment
  - Cameras; Variable Message Signs; Detection Sensors/Devices; Highway Advisory Radios
- Network Backbone
  - Hubs and Nodes; Fiber; Cabinets; Software
- Sidewalks and Curbs
State-of-the-Practice

• Internationally-accepted standards for the management of physical infrastructure assets (ISO 55000 and PAS 55)

• Considerable body of knowledge related to the management of pavements and bridges in the U.S.

• Passage of MAP-21 resulted in new asset management requirements – primarily focused on pavement and bridge assets

• Much of the literature on ancillary asset management captures state-of-the-practice

• Generally no industry standards for the management of ancillary roadway assets
Life Cycle Management Principles

• Project team used the terminology and elements of asset management as outlined in PAS 55 and ISO 55000

• Management system (ISO 55000): a set of interrelated or interacting elements of an organization to establish policies and objectives, and processes to achieve those objectives

• Asset management information (PAS 55): meaningful data related to assets and asset management

• Asset management information system (PAS 55): a system for the storage, processing, and transmission of asset management information
Key Elements for Asset Management

- Organizational Strategic Plan
- Policy Goals and Objectives
- Long Range Transportation Plan
- Statewide Transportation Improvement Program (STIP)

Policy and Strategy

- MAP-21 Compliant Asset Management Plans
- Cross-asset Planning and Management
- Performance-based Budgeting

Asset Management Plans

Implementation of Asset Management Plans/Life Cycle Management Activities

- Link between Everyday Asset Management Activities and Policy/Strategy
Integrating Ancillary Assets into Enterprise Asset Management Systems

![Diagram showing the integration of financial and accounting management, capital programming, GASB reporting, HR management, asset inventory, asset condition, condition monitoring, facilities management, warranty/claims tracking, maintenance management, work orders, labor/equipment costs, asset condition updates, scenario analysis, data analysis, trade-off analysis, linear referencing system, project management system, GIS mapping tools, and operations and control systems.](image-url)
Template for Life Cycle Management Business Process Guidance

• **Enterprise-level**
  – Inventory
  – Interaction between Asset Classes
  – Relationship of Asset Class to Overall Safety, Mobility, and Asset Performance

• **Asset Specific-level**
  – Inspection and Condition Assessment
  – Level of Service/Performance Metrics
  – Lifecycle Management Plans and Practices
  – Asset Prioritization
  – Decision Support

• **Additional Sections**
  – Asset Element-specific Considerations
  – Additional References
Sample Template – High Mast Light Poles

• **Asset Element-specific Considerations**
  – Provide proven improvement to nighttime driving conditions
  – Height presents challenge for inspections

• **Enterprise-level**
  – Inventory
    • Recommended complete inventory with basic data items including location, condition, and age
  – Interaction between Asset Classes
    • Failure can result in closure of crucial links in the highway system
  – Relationship of Asset Class to Overall Safety, Mobility, and Asset Performance
    • Provide illumination that can improve safety
High Mast Light Pole Template

- **Asset Specific-level**
  - Inspection and Condition Assessment
    - Visual inspections with binoculars or telescopes
    - Remotely-operated inspection devices with video cameras
    - NDT techniques to inspect base plates and anchor rods
    - Inspect at least every 4 to 5 years – potentially greater frequency for anchor bolts which are known to loosen over time
  - Level of Service/Performance Metrics
    - Typically simple condition rating scale comparing current performance against originally intended function
  - Lifecycle Management Plans and Practices
    - Track maintenance activities and forecast future activities such as anchor bolt tightening, repair, or replacement
    - Account for need to replace lamps
  - Asset Prioritization
    - After high-wind weather events prioritize inspections
    - Prioritize inspections in areas with known nighttime safety issues
  - Decision Support
    - Track maintenance costs to inform future needs estimates
    - Estimate remaining service life based on installation date and age
High Mast Light Pole Template Continued

• **Additional References**
  - Sheth, P.N. & Montie, D., 2005. Integrated Light Maintenance and Inspection System for High-Mast Poles, Charlottesville, VA.
Results and Next Steps

- Results of this research provide a foundation to develop TAMPs for a subset of ancillary assets
  - Final report available online: [http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP08-36(114)_FR.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP08-36(114)_FR.pdf)

- We would like to take this further to develop generally accepted standards for the management of ancillary assets, particularly for:
  - Culverts
  - Drainage Systems and Environmental Mitigation Features
  - Network Backbone
  - Sidewalks and Curbs