Asset Management With a Focus on Safety
Developing Robust Safety Programs Through Transportation Asset Management Practices

Jack Stickel
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Road Safety Data Partnership
Effective Safety Programs Using TAM

- Motivation
- Road Safety Data Partnership (RDSP)
- DOT observations
- Digital image & linear referencing
- Conclusion
- Roadway safety & asset management links
Motivation

**MAP–21 Requirements (HSIP)**

- Data system must be able to identify safety problems and countermeasure analysis
- Improve timeliness, accuracy, completeness, and integration of safety data on all public roads
- Evaluate effectiveness of data improvement efforts
- Link state data systems, including traffic records, with other data systems
- Improve capability and interoperability of safety with other state transportation data related systems
- Improve collection of data in non–motorized locations
- Identify hazardous crash locations & severity locations
Motivation
MAP–21 Data Improvement Activities (HSIP)

- Create, update, or enhance a highway basemap on all public roads
- Collect safety data
- Store and maintain safety data in an electronic format
- Develop analytical processes for safety data
- Acquire and implement roadway safety analysis tools
- Support the collection, maintenance, and sharing of safety data on all public roads
Motivation

MAP–21 Transportation Asset Management (TAM)

National Highway System Performance
- Bicycle transportation & pedestrian walkways
- Highway safety improvement
- State asset management plan
- Infrastructure–based intelligent transportation system capital improvements

Risk–based asset management plan
- All infrastructure assets within corridor right–of–way
Motivation
Transportation Agency Rationale

Provides a strategic planning approach for the Long Range Transportation Plan (LRTP) and Transportation Asset Management Strategic Plan (TAM)

Provides a comprehensive approach to life-cycle programming for Highway Safety Improvement Program (HSIP) and Statewide Transportation Improvement Program (STIP) projects

Applies non-highway elements to highway safety and asset performance:

- Environmental
- Winter weather maintenance treatments
- Seasonal weight restrictions
- Weather Responsive Traffic Management (WRTM)
Motivation

First Harmful Event – MMUCC

The first injury or damage-producing event that characterizes the crash type

Motivation

Fatality Analysis Reporting System (FARS)

First Harmful Event: 2001 – 2010 FARS
### Roadway Safety Elements

**Effective Safety Programs Using TAM**

<table>
<thead>
<tr>
<th>Lanes</th>
<th>Pavement</th>
<th>Right of Way</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curve &amp; grade</td>
<td>Condition</td>
<td>Barriers/Attenuators</td>
</tr>
<tr>
<td>Intersections</td>
<td>Curbs</td>
<td>Clear zones</td>
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<tr>
<td>Merging</td>
<td>Markings</td>
<td>Fences</td>
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<tr>
<td>Passing</td>
<td>Rumble Strips</td>
<td>Guardrails</td>
</tr>
<tr>
<td>Ramps</td>
<td>Shoulders</td>
<td>Retaining walls</td>
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<tr>
<td>Roadway sections</td>
<td>Striping</td>
<td>Supports</td>
</tr>
<tr>
<td>Roundabouts</td>
<td>Width</td>
<td>Luminaires</td>
</tr>
<tr>
<td>Shoulders</td>
<td></td>
<td>Traffic signs</td>
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<tr>
<td>Through</td>
<td></td>
<td>Utility</td>
</tr>
<tr>
<td>Turning</td>
<td></td>
<td>Unstable slopes</td>
</tr>
</tbody>
</table>
## Roadway Safety Elements

### Effective Safety Programs Using TAM

<table>
<thead>
<tr>
<th>Miscellaneous</th>
<th>ITS</th>
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</thead>
<tbody>
<tr>
<td>Bicycle facilities</td>
<td>Commercial vehicle detectors</td>
</tr>
<tr>
<td>Bridges</td>
<td>Dynamic message signs</td>
</tr>
<tr>
<td>Condition</td>
<td>Lane control</td>
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<tr>
<td>Clearances</td>
<td>Ramp metering</td>
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<tr>
<td>Pier, rail, support</td>
<td>Road weather weather systems</td>
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<tr>
<td>Culverts</td>
<td>Temperature data probes</td>
</tr>
<tr>
<td>Overpasses</td>
<td>Traffic control devices</td>
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<tr>
<td>Pedestrian facilities</td>
<td>Traffic count devices</td>
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<tr>
<td>Sidewalks</td>
<td>Truck weight &amp; inspection stations</td>
</tr>
<tr>
<td>Tunnels</td>
<td>Variable speed limits</td>
</tr>
</tbody>
</table>
Roadway Safety Data Partnership

Collaborative effort between FHWA and States whose goal is ensure that states are best able to develop robust data-driven safety capabilities

http://safety.fhwa.dot.gov/rsdp/
DOT Perspective

Improve DOT capabilities to:

- Collect and archive enterprise roadway assets
- Integrate asset management and safety information
- Link safety data to non-safety data

that will provide a consolidated data program to address highway safety, asset management, and system performance.....
Roadway Safety Data Partnership Assessment

Focuses on four key areas:

- Roadway data collection and technical standards
- Data analysis tools and uses
- Data management and governance
- Data interoperability and expandability
Roadway Safety Data Capability Assessment

**Benefits:**

- Gauge where we are in regards to safety data capabilities, especially in regards to roadway inventory
- Establish a framework action plan to achieve self-identified goals
- Integrate improvements into safety plans
- Identify the types of support we need to improve safety & road inventory data systems
Data interoperability and expandability:

- Associating roadway attributes with crashes
- Expandability: across business areas within agency & with other agencies in a spatial world

Integrate roadway data files with:
- Crashes
- Traffic (AADT)
- Feature inventories
- Digital imaging
Observations – Overview

The Roadway Safety Data Partnership:

- Provides an excellent self-assessment guide for evaluating the agency’s standing for the MIRE data elements.

- Defines road inventory gaps that can help with a trade-off analysis and developing a road inventory improvement program.

- Establishes a data collection structure for a Data Business Plan to meet the agency’s core transportation information needs.
The Roadway Safety Data Partnership links highway safety to other DOT programs:

<table>
<thead>
<tr>
<th>Transportation Program Areas</th>
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<tbody>
<tr>
<td>Asset management</td>
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<tr>
<td>Bridge management</td>
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<tr>
<td>Budget allocation</td>
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<tr>
<td>Design &amp; construction</td>
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<tr>
<td>Health records</td>
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</tbody>
</table>
The Roadway Safety Data Partnership can provide significant benefit to DOT programs:

- Model Inventory of Roadway Elements (MIRE)
- Highway Performance Monitoring System (HPMS)
- Crash Data Improvement Program (CDIP)
- Highway Safety Improvement Program (HSIP)
- NHTSA Traffic Records Assessment Process
- Strategic Highway Safety Plan (SHSP)
Model Inventory of Roadway Elements

**MIRE Data Dictionary**, Version 1.0, Oct 2010

Provides common definitions and attributes for recommended roadway inventory and traffic elements critical to safety

- Roadway segments, alignments, & junctions
- Links to supplemental databases: automated enforcement devices, bridges, railroad crossings, roadside fixed objects, speed data, signs, safety improvements

Companion to the Model Minimum Uniform Crash Criteria (**MMUCC**)
HPMS – national level highway information reporting system that includes:

- Extent
- Condition
- Performance
- Use
- Operating characteristics
CDIP – emphasizes the role of crash data quality and why it is important

Defines measures to assess deficiencies and establish benchmarks in each step of the crash production process:

- Collection
- Processing
- Reporting
Crash Data Improvement Program

Provides metrics for crash data:

- Accessibility
- Accuracy
- Completeness
- Consistency
- Integration
- Timeliness
Observations – The Process

Road Safety Data Partnership offers a step by step process to develop:

- A road inventory program to meet the agencies road network needs for highway safety and asset management.

- Integration strategies with safety and other road inventory databases.

- An effective performance measures program for highway safety, road inventory, and asset management.
Observations – Agency Requirements

- An established highway basemap for all public roads that enables spatial analysis capabilities.
- An enterprise linear referencing system (LRS) to integrate safety and asset management data to meet the agencies specific linear referencing method.
- Automated data inventory program and data processing tools.
Automated, to the extent possible, crash location tools that are fully integrated with GIS, LRS, and digital imaging.

Performance measure and data quality assessment program that conforms to the agencies business needs.

- Establish – get basics online, e.g., RDSP
- Evaluate – gap analysis & work plan
- Revise – tweak programs and targets
Observations – Data Management & Governance

**People – data champions & stewards across disciplines**

**Policies**
- Governance boards & leadership councils
- Traffic Records Coordinating Committee (TRCC)
- Data dictionaries, definitions, standards, processes
- Data Business Plan

**Technology**
- Standard business rules
- Performance measures
- Tools for automation
- Refresh and expansion
Digital Imaging & Linear Referencing
Asset Management Location Referencing

Data collection
run milepoint

Linear reference
system milepoint
The RSDP offers an approach for:

- Consolidating road inventory programs that are often duplicative and not integrated into a common GIS and linear referencing system
- Risk assessment and tradeoff analysis on which roadway inventory items to collect
- Getting an inventory program started, especially in new areas, e.g., pedestrians and bicycles
- Better communication across the agency on roadway information collection, integration, and access
Links

- Association of Transportation Safety Data Professionals
- Asset Management and Safety Peer Exchange (FHWA–HIF–12–005)
- Crash Data Improvement Program
- Fatality Analysis Reporting System
- FHWA – Highway Safety and Asset Management
- FHWA – Office of Safety
- FHWA – Office of Infrastructure
- FHWA – Operations
Links

- National Highway Traffic Safety Administration
- Road Weather Management – FHWA
- Roadway Safety Data Partnership (RDSP)
- Safety Data Community of Practice
- Strategic Highway Safety Plan (SHSP)
- Traffic Records Assessment – NHTSA
- Traffic Records Coordinating Committee (TRCC)
- Traffic Records Improvement Reporting System (TRIPRS)
Links

- Transportation Asset Management Guide – A Focus on Implementation (AAHSHTO, Jan 2011)
- USDOT – Federal Motor Carrier Safety Administration
- USDOT – Traffic Records Coordinating Committee
- Weather Responsive Traffic Management
- "Why Your Agency Should Consider Asset Management Systems for Roadway Safety" (FHWA–05–0771)
Contact

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