WisDOT Asset Management and Performance

Wisconsin Inter-Tribal Task Force
New Horizons
Wisconsin Tribal Transportation Conference
October 29, 2018

Tom Beekman, Director Emeritus
WisDOT Division of Transportation System Development
Office of Asset Management and Performance
Asset Management

- Definition of an asset:
  - "If you own it and spend public dollars to maintain it, improve it, or replace it; it’s an asset that needs to be managed"

- How each State DOT decides to manage those assets is a fundamental core responsibility.

- Asset management is not a ‘cheapest solution’ philosophy.

- Asset management focus is on **system**-optimized infrastructure improvement recommendations rather than **project**-optimized recommendations.
Asset Management

• WisDOT will use Performance-Based Practical Design (PBPD) as an asset management tool.

• WisDOT will manage transportation assets based on safety evaluation and analysis.
FHWA Nationwide Application

The EDC Data-Driven Safety Analysis Initiative...

• Goal: Integrate safety performance into ALL highway investment decisions
FHWA Nationwide Application

**Pavement Performance Measures**

**Final Rulemaking**

The Federal Highway Administration (FHWA) published in the *Federal Register* (82 FR 5886) a final rule establishing performance measures for State Departments of Transportation (DOTs) to use in managing pavement and bridge performance on the National Highway System (NHS). The National Performance Management Measures; Assessing Pavement Condition for the National Highway Performance Program and Bridge Condition for the National Highway Performance Program Final Rule addresses requirements established by the Moving Ahead for Progress in the 21st Century Act (MAP-21) and reflects passage of the Fixing America’s Surface Transportation (FAST) Act. The rule is effective May 20, 2017.

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<th>Performance Measures</th>
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<tbody>
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<td>✓ % of Interstate pavements in Good condition</td>
</tr>
<tr>
<td>✓ % of Interstate pavements in Poor condition</td>
</tr>
<tr>
<td>✓ % of non-Interstate NHS pavements in Good condition</td>
</tr>
<tr>
<td>✓ % of non-Interstate NHS pavements in Poor condition</td>
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</table>

**About Condition**

- **Good condition:** Suggests no major investment is needed.
- **Poor condition:** Suggests major reconstruction investment is needed.

**Penalty Provisions**

If FHWA determines the State DOT’s Interstate pavement condition falls below the minimum level for the most recent year, the State DOT must obligate a portion of National Highway Performance Program (NHPP) and transfer a portion of Surface Transportation Program (STP) funds to address Interstate pavement condition.

**Target Setting**

**State DOTs:**
- Must establish targets, regardless of ownership, for the full extent of the Interstate and non-Interstate NHS.
- Must establish statewide 2- and 4-year targets for the non-Interstate NHS and 4-year targets for the Interstate by May 20, 2018, and report by October 1, 2018.
- May adjust targets at the Mid Performance Period Progress Report (October 1, 2020).

**Metropolitan Planning Organizations (MPOs):**
- Support the relevant State DOT(s) 4-year target or establish their own by 180 days after the State DOT(s) target is established.
FDM Revised Sections Overview

- FDM Chapter 3
  - FDM 3-1
  - FDM 3-5

- FDM Chapter 11
  - FDM 11-1
  - FDM 11-3
  - FDM 11-15
  - FDM 11-20
  - FDM 11-38 – new Safety Certification Process section
  - FDM 11-40
  - FDM 11-45
  - FDM 11-46

- FDM Chapter 13
  - FDM 13-1
  - FDM 13-45 – new section
FDM 3-1 Revisions – Process Overview

- Early and Accurate Project Scope, Schedule, and Budget
  - Final Scope Certification Requirement
    - Safety Certification
    - Pavement Certification
    - Structure Certification

- Scope, Schedule, Budget Performance Measures start at project initiation and delivery is managed to that.

- Asset management compliance part of every performance measure.
# FDM 3-1 Revisions – Process Overview

## Facilities Development Process

<table>
<thead>
<tr>
<th>Phase Elements</th>
<th>Project Initiation</th>
<th>Project Definition</th>
<th>Project Delivery</th>
<th>Project Proposal Execution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Life Cycle (Construction ID)</strong></td>
<td>00</td>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
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</table>

**Milestone**
- Project Initiation Complete
- Profile Scope Complete
- Final Scope Certification Approved
-Renewing Complete/Start Final Delivery
-Design Study Report Approved
-PS&E Submitted
-Project LET
-Project Award

**Scope**
- Conceptual Scope
- Profile Scope
- Final Scope
- Implement Scope

**Schedule**
- Conceptual Milestone Schedule
- RFP Target Goals & Schedule
- Program Let Schedule
- Final Milestone Schedule
- First Work Breakdown
- Final Project Schedule Date
- Non Let Schedule Dates

**Budget**
- Conceptual Cost Estimate
- Design Delivery Budget
- Cost Estimate
- Non Let Estimate
- Refine Cost Estimate
- Refine Non-Let Estimate

**Phase Deliverables**
- Design (El) loaded
- Construction (El) loaded
- Design (El) Authorized
- Higher Improvement Type
- Structures Identified
- Signed SMMA (design complete only)
- Purpose and Need
- Resources Assessments
- Safety Certification
- Structure Certification
- Improvement Strategy
- Risk Assessment
- Executive Consultant Contract
- Signed Pavement Design Report
- Chart Env. Document
- Utility Impacts
- EWP Impacts
- Structure Survey Report
- Railroad Prog. Submittal Package
- Signed SMMA & SIMMA (cert)
- Final Deliveries Receiving
- Final Receiving
- PS&E package
- Plan
- Bid Advertisement
- Addenda (if required)
- Bid Review
- Design ID Closed
- Design Files Archived

**Phase Activities**
- see FDM Chapter 3 - attachment 1.2

**Change Management**
- Establishes original baseline for applying Change Management process
- Change Management process in effect

*Links to Performance Measures*
## FDM 3-1 Revisions – Process Overview

<table>
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<tr>
<th>Phase Elements</th>
<th>Phase Names</th>
<th>Project Initiation</th>
<th>Project Definition</th>
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<tbody>
<tr>
<td>Life Cycle (Construction ID)</td>
<td></td>
<td>01</td>
<td>16</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>Milestone</td>
<td></td>
<td>Project Initiation Complete</td>
<td>Prelim Scope Complete</td>
<td>Final Scope Certification Approved</td>
<td>Reveiwign Complete Sign Time Delivery</td>
</tr>
<tr>
<td>Program Year</td>
<td></td>
<td>7-12</td>
<td>13</td>
<td>14</td>
<td></td>
</tr>
</tbody>
</table>

### Performance Measures

- Based on Program Year snapshot: Program Loaded On-Time (PLOT)
- Based on Program Year snapshot: Program On-Demand at Scoping (PODS)
- Based on Program Year snapshot: Program Scoped On-Time at Scoping (PSOT)
- Based on comparison of Life Cycle cost estimates: Program On-Demand at Let (PDOL)
- Based on comparison of Life Cycle cost estimates: Delivery On-Time (DOT)
- Based on snapshot at quarterly PSI data:
  - Engineering Estimates Accuracy
  - Active T31 Milestones Adw Table

- Based on comparison of Life Cycle cost estimate to contractor bid:
- Based on monthly snapshot:
- Based on annual snapshot:

*Update 7/2/2018*
Performance Based Practical Design
FDM 3-5 Revisions – Improvement Concepts

**Perpetuation** = No change to existing geometric or typical section footprint.

**Rehabilitation** = Allows minimal work outside the exiting horizontal or vertical footprint as supported by safety certification.

**Modernization** = Construction on a new horizontal alignment, vertical alignment or where a roadway through travel lane(s) did not previously exist, or replacing or constructing a new bridge.
FDM 11-1 Revising Source and Application of Standards

- Application of Standards broken into 3 levels based on results of SCP and purpose and need:
  - S-1: Existing standards are standards for new design.
  - S-2: Assume lower end of the design standard ranges for the features contributing to safety and operational issues. Apply PBPD principles to satisfy purpose and need.
  - S-3: Use upper end of the design standard ranges as a starting point.
<table>
<thead>
<tr>
<th>Improvement Strategies</th>
<th>FDM 3-5-2 Highway “Roadway” Improvement Type</th>
<th>Improvement Concept Code</th>
<th>Improvement Concept Definition</th>
<th>From PMM 5-10-5</th>
<th>Geometrics</th>
<th>Roadside</th>
<th>Low Cost Safety Improvements (FDM 11-18-??)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perpetuation</td>
<td>Preservation Restoration</td>
<td>PSRS_XX (10-40)</td>
<td>Preservation/restoration treatments may address cracks, joints and surface imperfections, seal and protect the road surface, improve friction and/or remove and apply a minimal riding surface (code varies by treatment type)</td>
<td>No (based on service life)</td>
<td>S-1</td>
<td>Existing</td>
<td>No</td>
</tr>
<tr>
<td>Perpetuation</td>
<td>Resurfacing</td>
<td>RSRF10 RSRF20</td>
<td>Placing a new surface on an existing roadway to provide a better all-weather surface, a better riding surface, and to extend or renew the pavement life (code varies by thickness of resurface.)</td>
<td>Yes</td>
<td>S-1</td>
<td>Existing</td>
<td>No</td>
</tr>
<tr>
<td>Perpetuation</td>
<td>Bridge Rehabilitation</td>
<td>BRRHB</td>
<td>The preservation or restoration of the structural integrity of an existing bridge as well as work to correct safety defects.</td>
<td>Yes</td>
<td>S-1</td>
<td>Existing</td>
<td>No</td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>Reconditioning</td>
<td>RCND10 RCND20</td>
<td>Work in addition to resurfacing. Minor reconditioning (10) includes intersection work, pavement widening and/or shoulder paving. Major reconditioning (20) includes improvement of an isolated grade, curve, intersection or sight distance problem to improve safety.</td>
<td>Yes</td>
<td>S-1/5-2</td>
<td>Existing with minor improvements base on safety certification doc.</td>
<td>See FDM 11-46</td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>Pavement Replacement</td>
<td>PVPLA PVPR_O</td>
<td>Structural improvement of the pavement structure or removal of the total thickness of all paving layers from an existing roadway and providing a new paved surface without changing the subgrade. PVPR_O includes operational improvements.</td>
<td>Yes</td>
<td>S-1/5-2</td>
<td>Existing with minor improvements base on safety certification doc.</td>
<td>See FDM 11-46</td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>Bridge Replacement</td>
<td>BRLIM BRRPLE BRRPL</td>
<td>The building of a new bridge to replace an existing bridge.</td>
<td>Yes</td>
<td>S-1/5-2</td>
<td>Existing with minor improvements base on safety certification doc.</td>
<td>See FDM 11-46</td>
</tr>
<tr>
<td>Modernization</td>
<td>Reconstruction</td>
<td>RECST BRNEW</td>
<td>Total rebuilding of an existing highway to improve maintainability, safety, geometric and traffic service.</td>
<td>Yes</td>
<td>S-2</td>
<td>Utilize as much of existing alignments as practical. Make improvements base on safety certification doc.</td>
<td>Yes</td>
</tr>
<tr>
<td>Modernization</td>
<td>Expansion</td>
<td>RECSTE BRNEW</td>
<td>Includes the same types of work associated with reconstruction, but also involves the construction of additional through travel lanes or new structures.</td>
<td></td>
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</table>
FDM 11-38 Revisions
Safety Certification Process

• Transition to Highway Safety Manual (HSM) methodology.
• Produces Safety Certification Document (SCD).
• Authorizes Perpetuation/Rehabilitation/Modernization improvement concepts.
Substantive Safety vs. Nominal Safety

Approaches for Considering Safety

Nominal Safety

Examined in reference to compliance with standards, warrants, guidelines and sanctioned design procedures

Source: AASHTO

Substantive Safety

The actual or expected performance in terms of crash frequency and severity

Source: AASHTO

*Adapted from Ezra Hauer, ITE Traffic Safety Toolbox Introduction, 1999

FHWA PowerPoint (Every Day Counts) “Data-Driven Safety Analysis – Nominal vs. Substantive Safety” by John McFadden, P.E.
Safety Certification Process Flowchart

1. **Document in Safety Certification Document**
   - No further safety evaluation required for geometric improvements or low cost safety improvements.
   - Note: Roadside safety hardware may still need to be addressed.

2. **Start System Screening - Sites of Promise**
   - Crash Vetting - Sites of Promise
     - Retrieve and review all crash reports associated with the specific flagged crash locations.
     - Identify and summarize the contributing factors for each crash in the flagged locations. Remove and document all crashes that can not be mitigated through safety improvements.

3. **Are there remaining segmental crashes?**
   - NO
   - YES

4. **Follow the Contributing Geometric Analysis (CGA) process**
   - Are there remaining intersection crashes?
     - NO
     - YES

5. **Are there safety improvements needed to mitigate the remaining crashes?**
   - NO
   - YES

6. **Start Safety Mitigation Process**
Asset Management
Many-To-One Relationships

• Multiple assets chasing same program $$.  
  • STH Structure Assets and STH Pavement Assets ‘compete’ for 
    same SHR program $$.  

• Bring singular asset management systems into a blended system 
  asset management system to make appropriate prioritization 
  between assets.
WisDOT Structure Asset Management System

WISAMS

WISAMS has been adopted as the ‘thematic’ asset management system for S- and C- structures.

• It is the programmatic assumed treatment unless proven otherwise.

• It becomes the language by which treatment decisions are made

• The importance of structure inspection reports becomes paramount, and input to ensure it is collecting enough data in the correct way is dependent upon Region experts.
Nationwide Application

Bridge Performance Measures

Final Rulemaking

The Federal Highway Administration (FHWA) published in the Federal Register (82 FR5886) a final rule establishing performance measures for State Departments of Transportation (DOTs) to use in managing pavement and bridge performance on the National Highway System (NHS). The National Performance Management Measures; Assessing Pavement Condition for the National Highway Performance Program and Bridge Condition for the National Highway Performance Program Final Rule addresses requirements established by the Moving Ahead for Progress in the 21st Century Act (MAP-21) and reflects passage of the Fixing America’s Surface Transportation (FAST) Act. The rule is effective May 20, 2017.

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<td>✔ % of NHS bridges by deck area classified as in Good condition</td>
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<td>✔ % of NHS bridges by deck area classified as in Poor condition</td>
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Condition-Based Performance Measures

- Measures are based on deck area.
- The classification is based on National Bridge Inventory (NBI) condition ratings for item 58 - Deck, 59 - Superstructure, 60 - Substructure, and 62 - Culvert.
- Condition is determined by the lowest rating of deck, superstructure, substructure, or culvert. If the lowest rating is greater than or equal to 7, the bridge is classified as good; if is less than or equal to 4, the classification is poor. (Bridges rated below 7 but above 4 will be classified as fair; there is no related performance measure.)
- Deck area is computed using NBI Item 49 - Structure Length, and 52 - Deck Width or 32 - Approach Roadway Width (for some culverts).

Target Setting

State DOTs:

- Must establish targets for all bridges carrying the NHS, which includes on- and off-ramps connected to the NHS within a State, and bridges carrying the NHS that cross a State border, regardless of ownership.
- Must establish state-wide 2- and 4-year targets by May 20, 2018, and report targets by October 1, 2020, in the Baseline Performance Period Report.
- May adjust 4-year targets at the Mid Performance Period Progress Report (October 1, 2020).

Metropolitan Planning Organizations (MPOs):

- Support the relevant State DOT(s): 4-year target or establish their own by 180 days after the State DOT(s) target is established.
Asset Management
Many-To-One Relationships

• Different program $$ chasing same asset
  • STH Program and Highway Maintenance Program with pavement preservation actions.

• Singular asset management system ensures the thematic logic for pavement treatment on any highway segment is consistent regardless of the ‘color of $$’ used for that treatment.

• Treatment ‘harmonization’
HMM 04-05-01…Pavt Maintenance

Makes ‘harmonization’ between Theme X improvement and Highway Maintenance a policy manual reality.

• Links Highway Maintenance pavement activities to PMDSS and ‘thematic’ prioritization.

• Establishes 3-Year Pavement Maintenance Program requirement.

• Establishes asset management criteria required for DMA, PbM, and some RMA pavement projects.
Performance Measures

- FDM 3-1 referenced earlier tracks performance from program inception to program completed.
  - Program Loaded On Time
  - Program Scoped On Time
  - Program Delivered On Time
  - Program Delivered On Budget

- Advanceable Plan Letting Program (APLP)
  - PLP for advanceable program.

- Delivery Risk

- Theme Compliance
  - Program Effectiveness Measure
  - Each measure has this as identified criteria so it is being perpetually managed.
WisDOT DTSD
Office of Asset Management and Performance

- New Office Within DTSD Created In November, 2018
  - Tom Beekman appointed Director in November, 2018.
  - Brian Gaber appointed successive Director pending Beekman retirement in November, 2019.

- Office moved to DTIM on September 1, 2019.
  - Tom Beekman still Director remains in DTSD as transition assistance till April, 2020.
  - Brian Gaber is Director of DTIM OAMP.
Questions