FHWA/NSF Workshop on Future Directions for Long-Term Bridge Performance Monitoring, Assessment, and Management

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A State Perspective
Iowa DOT Bridge Concerns

- Reduced Revenue Growth
- Buying Power Reduction
- Increasing Traffic
- Increasing Truck Traffic
- Increasing Truck Traffic Loads
- Bridge Age and Condition
- Bridge Corrosion Issues
- Bridge Performance Monitoring
Reduced Revenue Growth

- Federal Funding – amount available for core highway programs has leveled off

- Iowa Road Use Tax Fund (RUTF)
  FY 2001–2006 - average annual growth has been 1.5 %

- Iowa DOT “TIME-21” Report on Iowa’s public roads system needs
Buying Power Reduction
1989 vs. 2006

- Reinforcing steel – 47% decline in buying power
- Structural steel – 34% decline in buying power
- Structural concrete – 48% decline in buying power
Bridge Construction Expenditures

Bridge and Culvert Projects
Primary and Interstate
Projected 2002-2011

<table>
<thead>
<tr>
<th>Year</th>
<th>Construction Cost (millions)</th>
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<tr>
<td>FY 02</td>
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<tr>
<td>FY 03</td>
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Percent Change: State Highway Funding Compared to Vehicle Miles Traveled and Lane Miles
Iowa Traffic Growth

- Total VMT: Green line
- Large Truck VMT: Red line


Millions of VMT: 0, 5000, 10000, 15000, 20000, 25000, 30000, 35000
Iowa Traffic Growth
Vehicle Miles Traveled

- Total VMT grew 36% from 1990-2005
- Large truck VMT grew 66% in same time
- Future large truck travel estimated to grow another 50% by 2020 (3%/yr)
- Total VMT expected to grow 1.75-2%/ yr
Iowa Bridge Office Concerns for Long-Term Bridge Performance

- Increasing truck loads
  - Bridge Office is working on an average of 50 permits per day for trucks over 156,000 lbs
  - Bridge Office is issuing an average of 7,500 permits per year for trucks over 156,000 lbs
Bridge Age and Condition
Iowa DOT Bridges
(Interstate System)
Number of Bridges, Narrow Bridges & Deck Area by Age

Year Constructed

- Number of Bridges
- Narrow Bridges**
- Deck Area

* Bridges on and over Interstate Routes.
**Narrow Bridges - Bridge narrower than approach roadway. These are included in "Number of Bridges"
Iowa DOT Bridges
(Exclusive of the Interstate System)*

Number of Bridges, Narrow Bridges & Deck Area
by Age

- **Number of Bridges**
- **Narrow Bridges**
- **Deck Area**

* Bridges on and over Interstate Routes not included

** Narrow Bridges- Bridge narrower than approach roadway. These are included in "Number of Bridges"
2005 Bridge Condition Data

- Nationally -
  - 594,616 Bridges
  - 75,871 Structurally Deficient Bridges
  - 80,306 Functionally Obsolete Bridges

- Iowa -
  - 24,807 Bridges (4,003 state)
  - 5,036 Structurally Deficient Bridges (241 state)
  - 1,762 Functionally Obsolete Bridges (307 state)
Bridge Conditions

Bar chart showing bridge conditions:
- US
- All Iowa
- IA Primary

Legend:
- Functionally Obsolete
- Structurally Deficient
- Total Bridges
Bridge Corrosion Issues
Bridge Deck Reinforcement

- IA Primary bridges: 4,003
- Black Bar only: 1,627
- Epoxy coated in top map: 420
Iowa Winters
Iowa Bridge Office Concerns for Long-Term Bridge Performance

- Salt related damage from corrosion
  - Pier cap/abutment bearing area
  - Concrete beam ends
  - Deck deterioration (throughout deck)
  - Weathering steel girder washing
  - Painted steel girder monitoring
  - Deck construction joints (gutter and vertical)
  - Leaking strip seal joints
Iowa Bridge Office Concerns - Bridge Performance Monitoring

- New design/construction techniques
- Innovative materials (MMFX, HPS, UHPC, FRP)
- Prefab bridge components (accelerated construction)
- Long-span steel bridge subject to high wind
- Bridges subjected to super loads
- Monitoring fatigue vulnerable details (Category E, out-of-plane bending, light towers)
Iowa DOT Bridge Concerns

- Reduced Revenue Growth
- Buying Power Reduction
- Increasing Traffic
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- Increasing Truck Traffic Loads
- Bridge Age and Condition
- Bridge Corrosion Issues
- Bridge Performance Monitoring
Competing Concerns and Needs

- Bridge Repairs/Rehabilitation
- Bridge Replacement
- Major System Reconstruction – Council Bluffs 180/129
- Future Mississippi and Missouri River Major Bridge Replacements
- New 4-Lane Construction Demands
- Capacity Issues
- System-Wide Maintenance
- Accelerated Construction Demands
State Needs for LTBP Program

- Develop a program that helps the states to meet their challenges
- Understand and appreciate these challenges
- Set data protocols
- Collect only the data that will lead to meaningful information and strategies
- Collect only accurate, precise data
- Focus on mining the data from the very beginning
- Focus on practical data for practical solutions vs an academic approach
- Focus on short and long term strategies
- Take advantage of existing monitoring efforts, data and research
- Include users (stakeholders) at every stage of program development