Bridge Performance Measures

Midwest Bridge Preservation Partnership Meeting

October 13, 2010

Detroit, Michigan

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Why Performance Measure for Bridges?

- Facilitates improvement of condition and services
- Shows tangible results to our customers and stakeholders
- A tool for strengthening accountability
- A tool to assess the effectiveness of allocated resources
- And so on….

Performance Measure is an Essential Component of Bridge Management

Sharing Practices Between DOTs

- There are several research initiatives that are sponsored by AASHTO Standing Committee on Performance Management

NCHRP 20-24(37)A	Measuring Performance among State DOTs: Sharing Good Practices -- Construction Project Cost and Schedule
NCHRP 20-24(37)B	Measuring Performance among State DOTs: Sharing Good Practices based on the International Roughness Index
NCHRP 20-24(37)C	Measuring Performance Among State DOTs, Sharing Best Practices -- Safety
NCHRP 20-24(37)D	Measuring Performance Among State DOTs, Sharing Best Practices--Operations Performance Using Incident Response Time
NCHRP 20-24(37)E	**Measuring Performance Among State DOTs, Sharing Best Practices— Preservation: Comparative Analysis of Bridge Conditions**
NCHRP 20-24(37)F	Establishment of Comparative Performance Measures Program Infrastructure to Support National System Performance Data Collection and Analysis
NCHRP 20-24(37)G	Technical Guidance for Deploying National Level Performance Measurements
NCHRP 20-24(37)H	Workshop on Transportation-System Performance Measures Suitable for National Use

NCHRP 20-24 (37)E Comparative Performance Measurement for Bridge Condition

- Report is based on NBI data for 34 States
- Report identifies 8 Bridge Condition Performance Measures
  1. Structurally Deficient Bridges – Deck Area (2009)
  2. Bridges with Sufficiency Rating (SR) ≤50 – Deck Area (2009)
  3. Posted Bridges – Deck Area (2009)
  4. Bridges in Good Condition (NBI GCR ≥7) - Deck Area (2009)
  5. Structurally Deficient Bridges – Deck Area (Change from 1999 - 2009)
  6. Bridges with Suff. Rating ≤50 – Deck Area (Change from 1999-2009)
  7. Posted Bridges - Deck Area (Change from 1999 - 2009)
  8. Bridges in Good Condition - Deck Area (Change from 1999 - 2009)

NCHRP 20-24 (37)E Comparative Performance Measurement for Bridge Condition

Performance Measure	Results Summary Across Participating States		
	Range	Mean	Median
1999 NBI Data			
SD Bridges	1% to 20 %	7%	6%
Low Sufficiency Rating	0% to 17%	4%	4%
Posted Bridges	0% to 18%	2%	1%
Bridges in Good Condition	3% to 83%	40%	38%
Change in Data from 1999-2009			
SD Bridges	-15% to +9%	22 States improved or stayed the same	
Low Sufficiency Rating	-12% to +4%	27 States improved or stayed the same	
Posted Bridges	-5% to +4%	27 States improved or stayed the same	
Bridges in Good Condition	-42% to +21%	14 States improved or stayed the same	

NCHRP 20-24 (37)E Comparative Performance Measurement for Bridge Condition

- Commendable Practices

  Criteria:

  – One State from each of the four regions (NE, S, MW, W)
  – States that are showing improvement in 2009 as well as improvements between 1999 – 2009
  – Used SD, SR, and Bridges in Good Condition measures

  Based on the aforementioned criteria the following sates were selected:

  – Kansas
  – Utah
  – New York
  – Georgia

NCHRP 20-24 (37)E Comparative Performance Measurement for Bridge Condition

Contributing Factors to Strong Performance

1. Make the Case for Bridge Investment
   - A. Establish and use Performance Measures for benchmarking bridge condition and communicating agency targets
   - B. Determine funding requirements to meet performance targets
   - C. Document agency approach to prioritizing rehab and replacement work to ensure funds are targeted to the appropriate projects and to improve accountability

2. Emphasizing Bridge Preservation
   - D. Inspect bridges at the element level
   - E. Track bridge-level work recommendations as part of bridge inspections, and establish an approach to tracking and prioritizing bridge work recommendations
   - F. Establish programs for common types of preservation actions such as bridge washing, joint repairs, deck overlays, painting and concrete repairs

NCHRP 20-24 (37)E Comparative Performance Measurement for Bridge Condition

Contributing Factors to Strong Performance (Cont'd)

3. Construct Maintainable Bridges
   - G. Discourage the use of high maintenance design details, i.e. eliminating expansion joints when possible
   - H. Encourage the use of standard designs – institutionalizing maintainable bridge designs to reduce the high maintenance details and reduce the time and cost for engineering
   - I. Take advantage of alternative contracting and delivery approaches such design/build and accelerated bridge construction
   - J. Enhance communications between bridge design and maintenance staff through quarterly or annual meetings

NCHRP 20-24 (37)E Comparative Performance Measurement for Bridge Condition

Recommendations for future Comparative Performance Measurement for Bridge Condition:

1. Continue use of performance measures based on NBI data for the short-term.
2. Support Transition to use element level data
3. Base bridge performance measure on Deck Area
4. Use good, fair, poor categories
5. Include SD bridges as a supplement measure
6. Track bridge condition measure independent of bridge decks
7. Track changes in bridge condition in addition to current condition
8. Don’t use posted bridges as a primary measure
9. Support bridge inspectors training and QA
10. Improve bridge cost data

Bridge Preservation Thoughts

Bridge Management Program Approach

- Three Components Approach
  - Preservation
  - Rehabilitation
  - Replacement

Bridge Preservation Thoughts

Essential components of a good bridge preservation program:

- Funding – establish dedicated funding mechanism separate from rehab, replacements, and capital improvements funds
- Program Parameters - identify strategies and qualifying activities
  - Consider an approach that focuses on bridges that are in fair to good condition
  - Consider an approach that focuses on cyclical activities, i.e. cleaning bridges, lubricating bearing, tightening fasteners, sealing decks, zone painting steel girders, etc.
  - Consider an approach that is condition driven, i.e. painting steel elements, installing deck overlays, replacing leaking deck joints, installing cathodic protection/prevention systems, etc

Bridge Preservation Thoughts

- Establish Bridge Preservation related performance measures

  Performance measure examples:
  - Maintaining X% of bridges in good condition
  - Maintaining X% of expansion joints in good and not leaking condition
  - Maintaining X% of coated steel surfaces in good condition
  - Maintaining X% of bearing devises in good condition
  - Clean 100% of all bridges that are in good condition annually
  - Consider establishing different Performance Targets for different highway systems, or different functional classification, or certain ADT ranges

Bridge Preservation Thoughts

- Perform bridge preservation needs assessments based on the established program parameters noted previously
- Establish performance measure bench mark, monitor the overall performance of the program regularly, and make adjustments as needed

- Similar steps can be considered in establishing dedicated rehabilitation and replacement programs

Thank you!

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