

Performance Measures for Bridge Preservation

Bridge Preservation Expert Task Group

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Performance Measures: Context

DOTs' Inputs

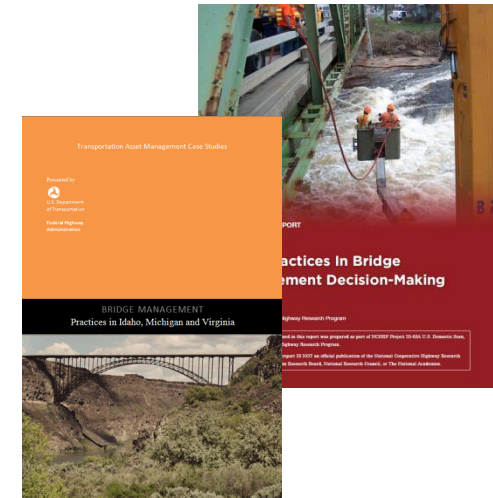
- Questionnaire to US State DOTs
- Scans and Case Studies

Published Practices

- Midwest Transportation Knowledge Network
- Washington DOT Performance Measure Library

Proposed Performance Measures

- Building on existing data
- Relevant to bridge preservation



**Washington State
Department of Transportation**

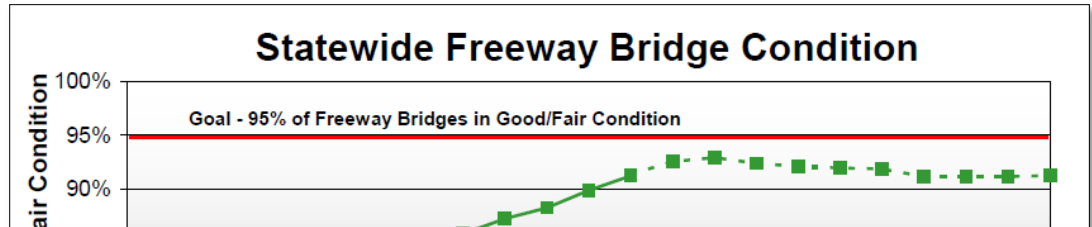
scan http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-68A_07-05.pdf

MTKN <http://members.mtkn.org/measures/>

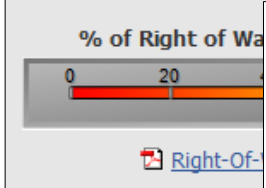
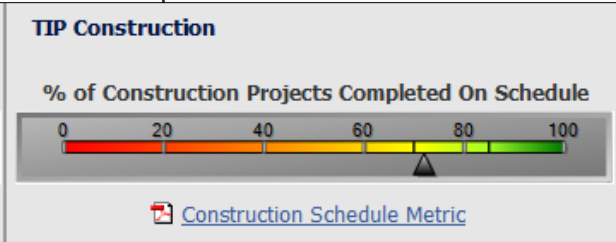
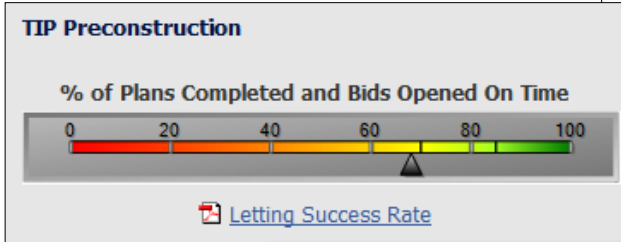
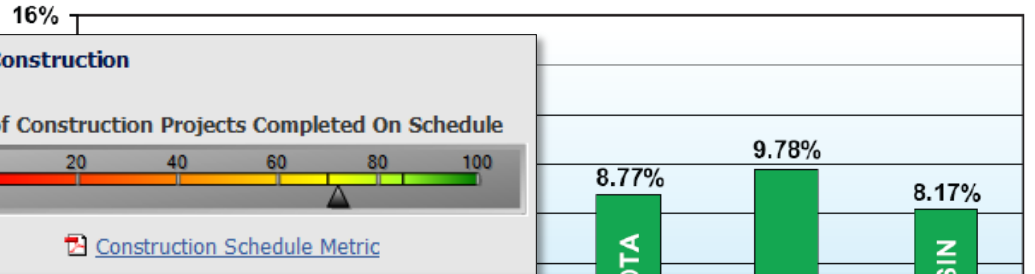
WsDOT <http://www.wsdot.wa.gov/Accountability/Publications/Library.htm>

Performance Measures: Present Day

Bridge Condition
Bridge Status
Bridge Programs
Maintenance Operations



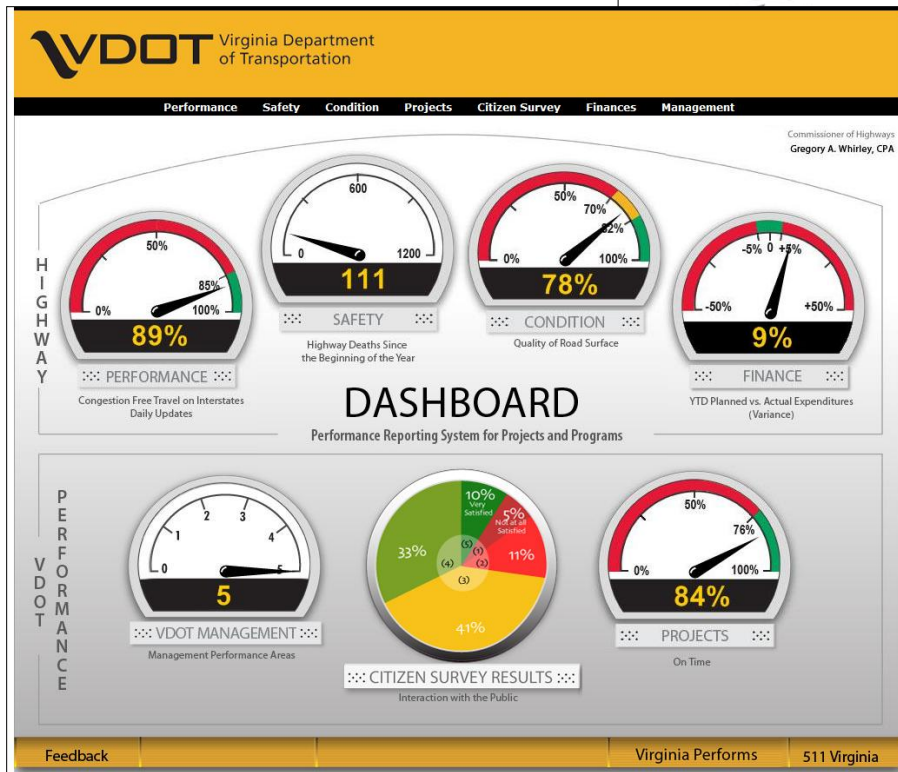
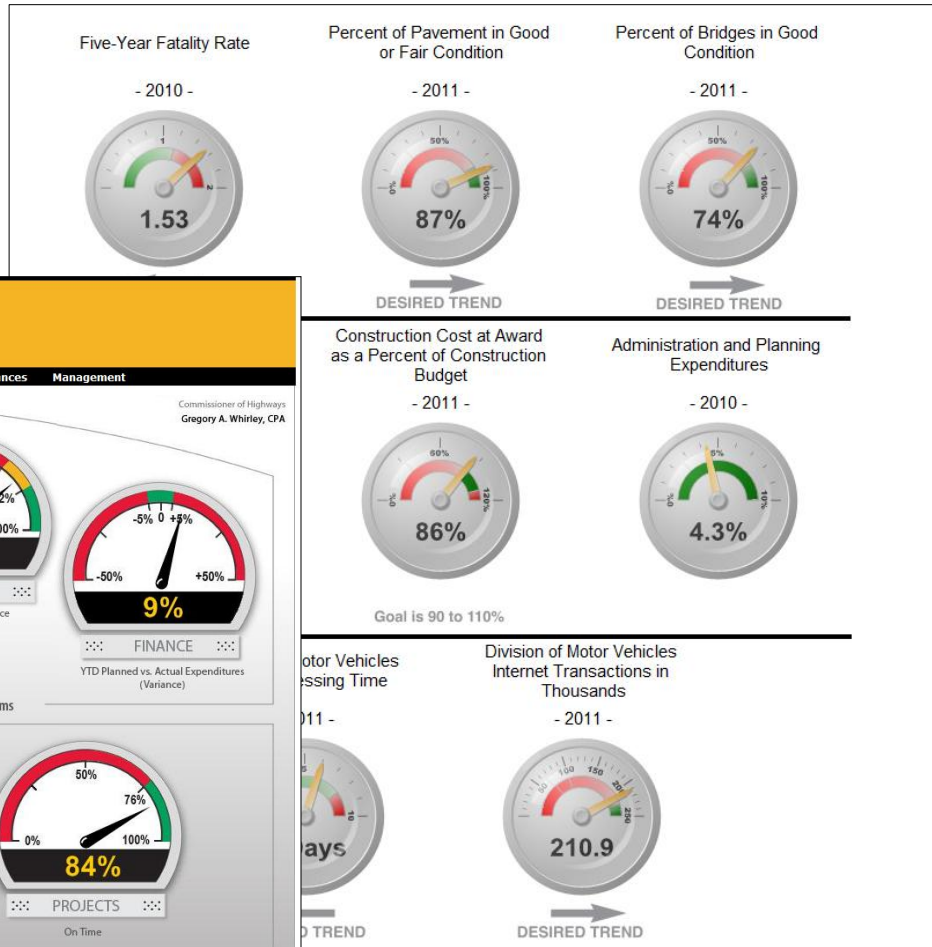
2010 Percent Structurally Deficient Bridges All Roadway Bridges (Great Lakes States)



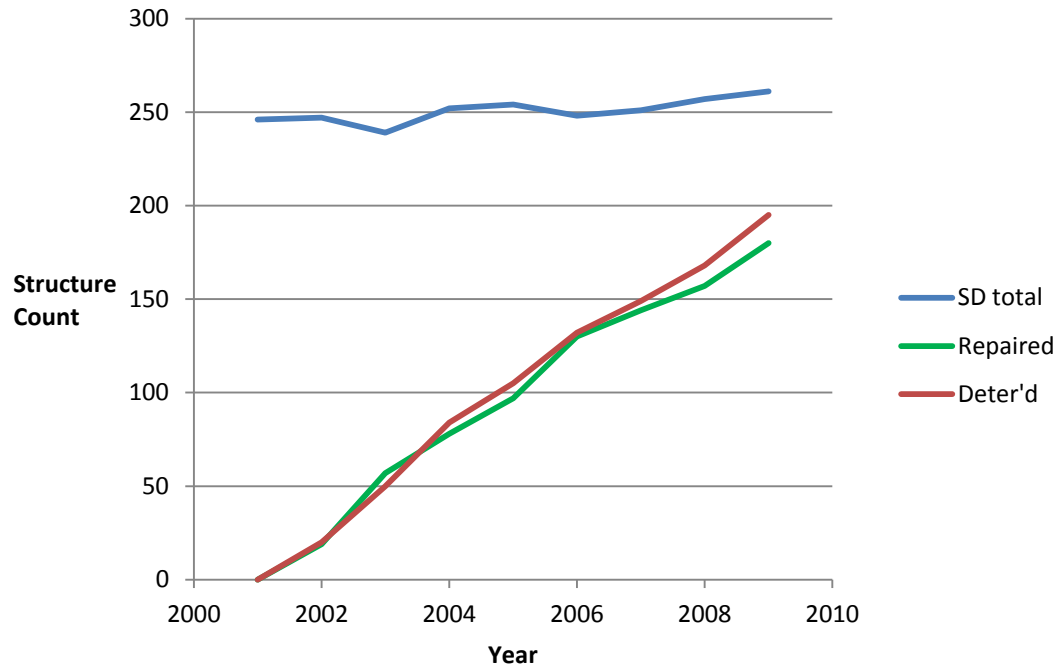
Maintenance Accountability Process Activity Service Level Target and Service Levels Delivered CY 2011 - Statewide Area: All Section: All

Activity	1.0	1.9	2.0	2.9	3.0	3.9	4.0	4.9	5.0	5.9
	+ A	-	+ B	-	+ C	-	+ D	-	+ F	-
Group - 4 Bridge and Urban Tunnel Maintenance and Operations										
4A1 Bridge Deck Repair					✓	⊙				
4A2 Structural Bridge Repair						⊙	✓			
4A3 Bridge Cleaning			✓			⊙				

Performance Measures: Present Day



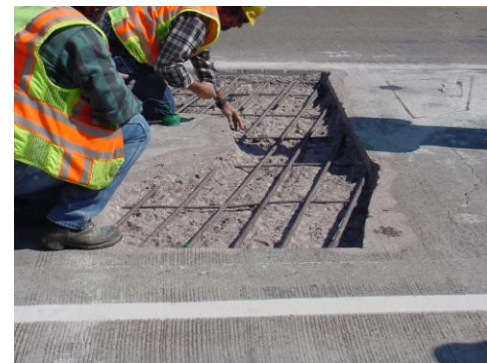
Performance Measure: Structurally Deficient



Colorado, State-Owned Structures

Performance Measures: Bridge Preservation

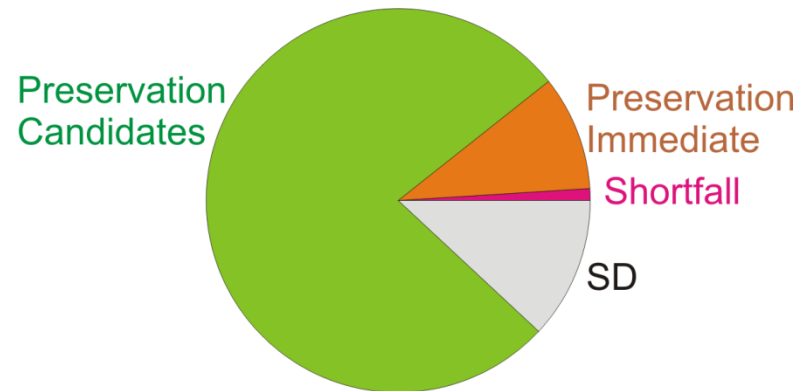
Preservation Candidates Counts or deck area of bridges to be preserved.	Preservation Stock
	Preservation Immediate
	Average Condition
	Preservation Shortfall
Preservation Needs Quantities of actions needed to preserve candidates.	Annual Bridges
	Annual Elements
Preservation Plan Resources required to deliver actions.	Budgets
	Resources
Preservation Benefits Cost savings achieved by bridge preservation	Cost Savings
	Bridge Conditions



Performance Measures: Preservation Candidates

Preservation Stock	Count or deck area of bridges at NBI 5 or higher (NBE 3 or better).
Preservation, Immediate	Count or deck area of bridges at NBI 5 only, (NBE 3 only).
Average Condition	Average NBI ratings or NBE ratings among preservation stock.
Preservation Shortfall	Count or deck area of bridges that transition to poor condition annually.

	Deck Area SY	Average Condition
NBI Structures	3,490,000	6.2
Preservation Candidates	3,070,000	7.0
Shortfall, annual	35,000	



Colorado, State-Owned Structures

Performance Measures: Preservation Needs

$$\text{Annual Need} = \frac{\text{Candidates}}{\text{Interval}}$$

Colorado – Condition Data

	Condition Scale	Preservation at Condition	Inventory (Candidates)	Annual Need
Bridge	9 - 0	5	3040	86
Joints	1 - 3	3	379,495 FT	10,300 FT
Decks	1 - 5	4	3,070,000 SY	87,700 SY

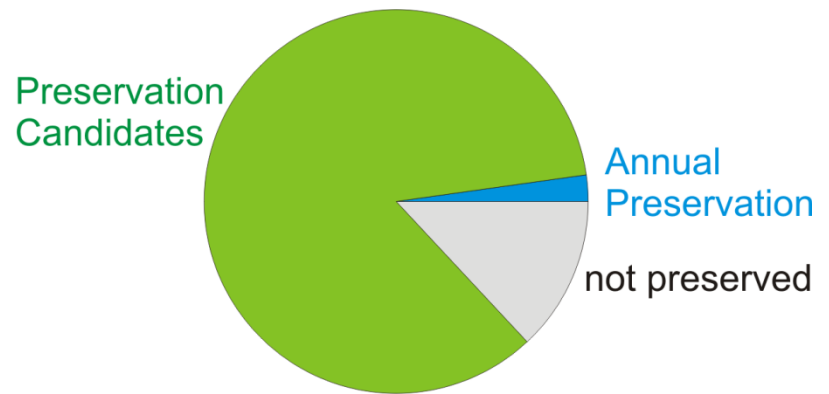
Virginia – Preventive Maintenance

Preventive Maintenance	Interval (years)
Cleaning and lubricating bearing devices	4
Scheduled replacement of pourable joints	6
Scheduled replacement of compression seal joints	10
Scheduled beam ends painting	10
Installation of thin epoxy concrete overlay	15

Performance Measures: Preservation Plan

$$\text{Annual Plan} = \text{Annual Need} \times \text{Unit Cost}$$

	Annual Need	Annual Plan
Bridges	86	\$ 34, 000, 000
Joints	10,300 FT	\$ 309, 000
Decks	87,700 SY	\$ 3, 500, 000

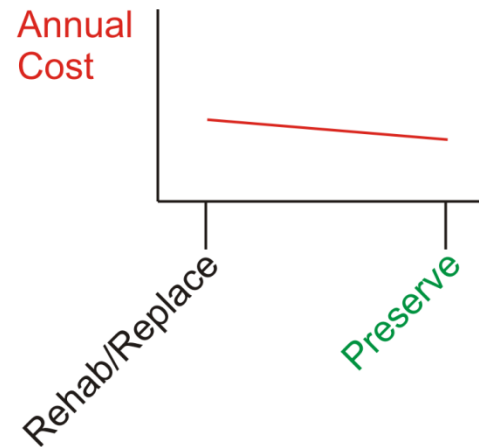
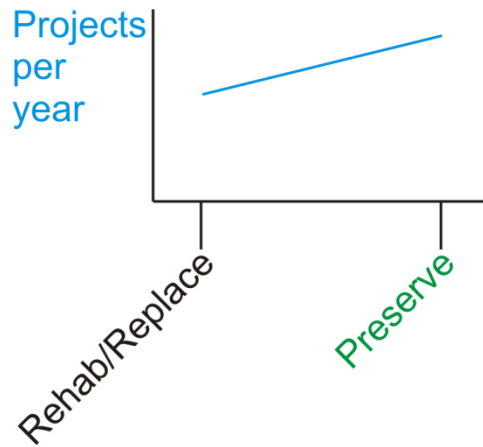


Colorado, State-Owned Structures

Performance Measures: Preservation Benefit

Interval ↔ Condition ↔ Extent ↔ Cost

Program	Structures per year	Annual Cost
All-Preservation	86	\$ 34,400,000
All-Rehabilitation	54	\$ 44,500,000



Colorado, State-Owned Structures

Performance Measures: Bridge Preservation

Preservation Candidates	Growth / Loss
	Pct of Inventory
	Average Condition
Preservation Needs	Achieved vs. Need
Preservation Plan	Allocation vs. Need
Preservation Benefits	Savings for Achieved Projects

Performance Measures: Summary

Proposed:

- Population of preservable structures
- Network-level measures of need, plan and benefit
- Use of existing condition data, deterioration intervals and average costs

Lacking:

- Priorities in preservation
- Performance of specific products and methods
- Complete basis for non-preserved structures

Next Steps:

- Trial application of network-level measures to State DOTs
- States' input on utility of performance measures

Performance Measures for Bridge Preservation

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