National Cooperative Highway Research Program

Project NCHRP 14-36

Proposed AASHTO Guide for Bridge Preservation Actions

http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=3951

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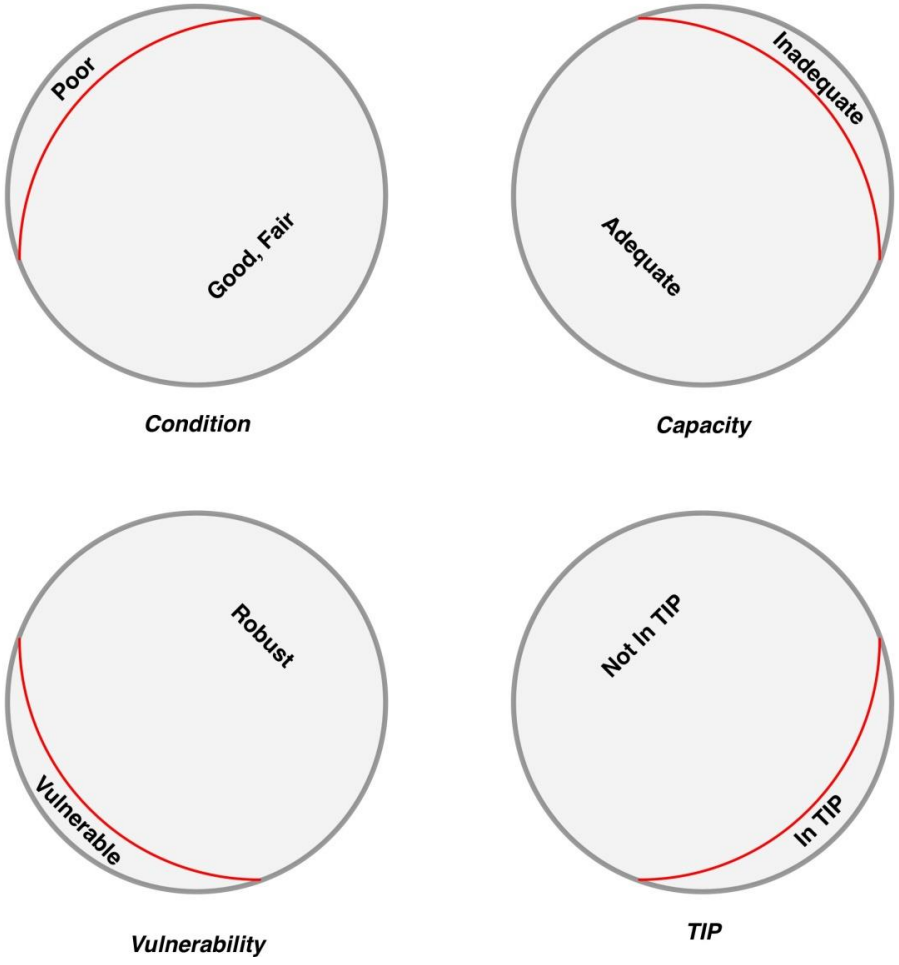
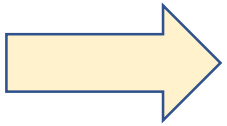
Bridge Population to Preserve





Bridge Population to Preserve

Preservation Level	Condition NBE	Condition BME	Capacity	Vulnerability	Remaining Life
Preventive	Good	Good, Fair	Adequate	Robust	≥ 20 years
Corrective	Fair	Poor			
Not preserved	Poor	-	Not adequate	Vulnerable	< 20 years

Bridge Preservation - Actions

Level	Sub-Level	Typical Actions
Preventive	*Scheduled*	Clear, Clean, Wash, Flush Remove debris
	Evaluated	Seal surface, Seal cracks Healer/sealer, Polymer overlay Zone paint Replace joint seals Remove large debris

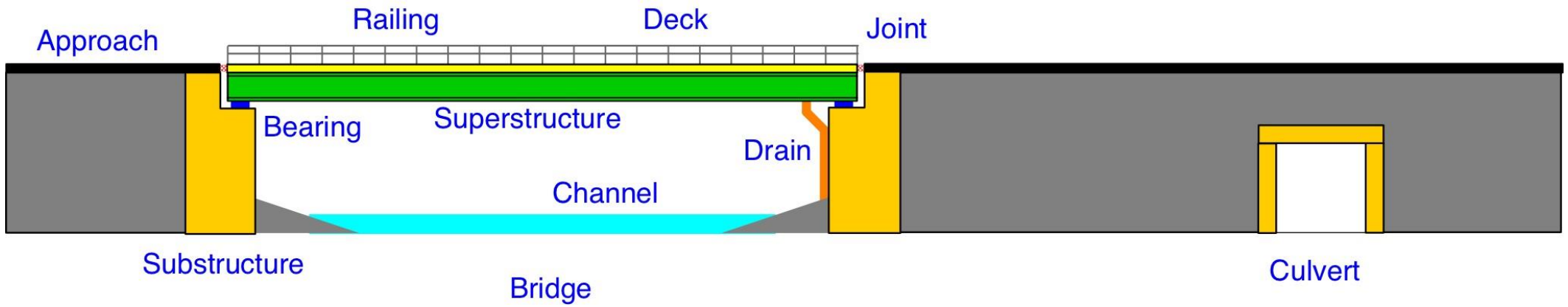
Bridge Preservation - Actions

Level	Sub-Level	Typical Actions
Corrective	*In-Kind*	Repair in-kind, Replace in-kind Straighten, Patch Complete paint Replace joint, Replace railing Dredge/re-establish channel
	Betterments and Retrofits	Fatigue retrofit Improve drain systems Improve or modify channels or bank protection Modify continuity Eliminate expansion joints Install pavement relief joints

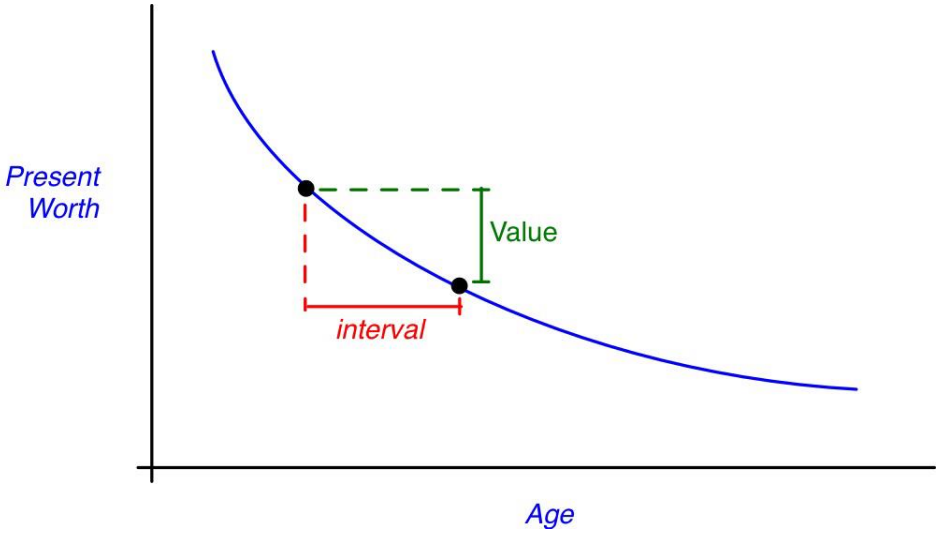
Bridge Preservation – Action Set for Deck

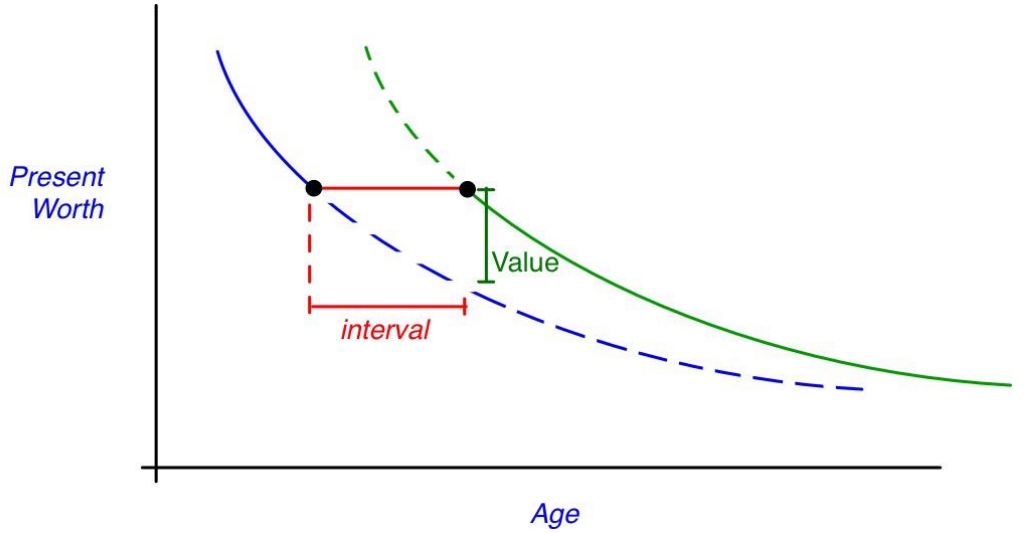
		All	RC	Steel	Timber
Prev.	*Sch'd*	Sweep, Power wash	Maintain cathodic protection		
	Evl'd	Seal cracks in wearing surface	Healer/sealer Polymer overlay Chip seal Seal cracks in deck Seal surface	Paint Bolt deck to stringers	Bolt deck to stringers Tighten rods (stress laminated) Replace running boards
Corr.	*In-Kind*		Replace wearing surface Repair spalls Repair cracks in structural deck Install rigid overlay Remove loose concrete, soffit Rebuild portion	Replace panel/section	Replace broken boards
	Bt & Rt	Improve drainage	Install cathodic protection Add AC + membrane		Add wearing surface

Bridge Preservation – Action Sets



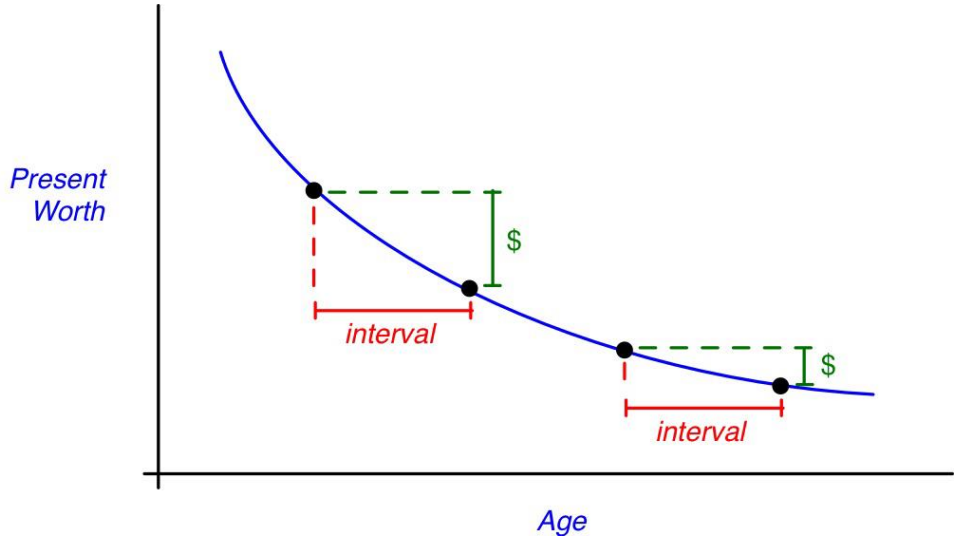
Bridge Preservation - Benefit





Bridge Preservation - Benefit

Age & Value



Annualized Costs

CT = Replace Cost / Untended Life

C0 = Replace Cost / Remaining Life

CP = (Replace Cost + Action Cost)/ Extended Life

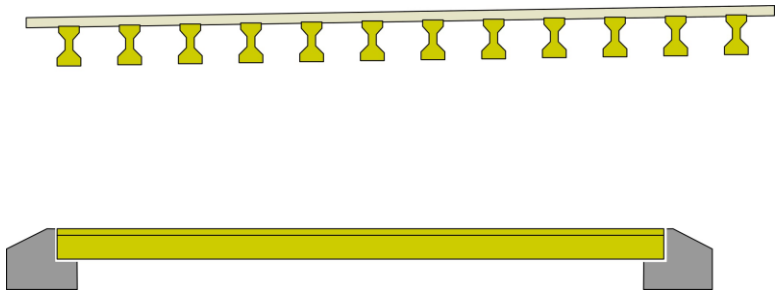
Decision to Act

$$C0 - CP > 0$$

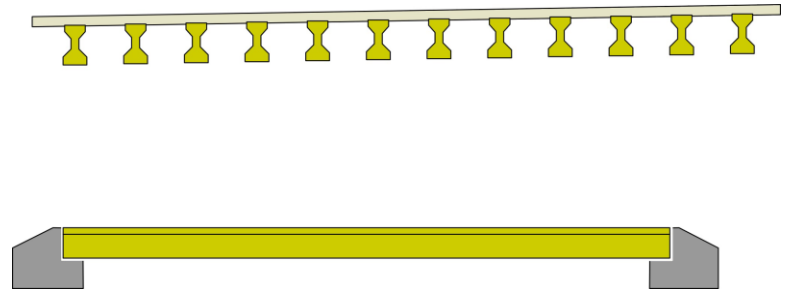
$$CP < CT$$

Bridge Preservation - Benefit

Replacement Cost, Girders =	$420,000
Replacement Cost, Joint Seal =	$7,200
Maintenance Cost, annual =	$7,200 / 5 yrs



Bridge Preservation - Benefit



	Service Life, yrs	Annual Girder Cost	Annual Maintenance Cost	Annual Benefit
Joints not maintained	40	$ 10,500 /yr	-	-
Joints maintained	75	$ 5,600 /yr	$ 1,440 /yr	$ 3,460 /yr

	Remaining Service Life, yrs	Annual Girder Cost	Annual Maintenance Cost	Annual Benefit
	--- After 20 years service ---			
Joints not maintained	20	$ 21,000 /yr	-	-
Joints maintained	55	$ 7,640 /yr	$ 1,440 / yr	$ 1,420 /yr
	--- After 40 years service ---			
Joints not maintained	35	$ 12,000 /yr	-	-
Joints maintained	35	$ 12,000 /yr	$ 1,440 / yr	$ (1,440) /yr

Guide for Bridge Preservation Actions

Elements of Bridge Preservation Programs Terms and definitions. Bridges to preserve. Preservation population. Agency structure. Overview of content and organization of this *Guide*.	**Bridge Preservation Actions** Preservation levels Catalog of preservation actions Performance standards for actions
Bridge Preservation Programming Intervals for actions in preventive scheduled maintenance Methods of assessment for preventive evaluated maintenance Repair needs - Evaluation of type and quantity of need Retrofit needs - Selection of type of modification or improvement	**Delivery of Actions** Bridge crews Letting Purchase order

Guide for Bridge Preservation Actions

Evaluation of Preservation Actions and Programs Evaluation of preventive maintenance MQA applied to samples of bridges Evaluation of repair actions Evaluation of retrofit actions	**Costs and Benefits** Capturing costs Capturing production units Cost benefit analysis
Data Systems Data requirements to support programs in bridge preservation Example data systems National database for maintenance actions at bridges	**Performance Measurement. Reporting** Performance measures: condition Performance measures: bridge status Performance measures: productivity Performance measures: cost benefits
Appendices Glossary References	

DOT Practices

Perform Action		
Pressure wash and paint		
	Bridges above Fall Line	10 years
	Bridges below Fall Line	15 years

Evaluate Need for Action		
Replace expansion joints	ADTT < 8%	15 years
	ADTT > 8%	10 years

Georgia DOT (2013). *Bridge Structures Maintenance Plan*. 9p.,

DOT Practices

Bridge Maintenance Manual PUB 55

SAP ASSEMBLY NUMBER: 711-7433-01 **BMS2 Flex-Action:** A743301

ACTIVITY TITLE: RESEAL DECK JOINTS (LIQUID ONLY)

UNIT OF MEASUREMENT: LINEAR FEET OF DECK JOINT

PROCEDURE: GENERAL PROCEDURE

REFERENCES

PennDOT Specifications (PUB 408)
Section521 -Transverse Joint Sealing and Cleaning
705 -Joint Material

SCHEDULING CONSIDERATIONS

Based on need as indicated by bridge inspections. Joint must be dry and temperature at or above 40°F.

Pennsylvania DOT (2010). *Bridge Maintenance Manual*. Pub 55, 398p.

DOT Practices

NBI Item	Element	NBI Criteria	Defect	Element Condition State	Repair Action	Potential Benefits to NBI or CS	Anticipated Service Life Years
Deck	Joints	Item 58 ≥5	2350	CS2, CS3, or CS4	Joint Clean	CS1 or CS2	
			2310		Joint Seal Replace, Restore	CS1	5 to 8
			2310 or 2360	CS3 + CS4 ≥ 10%	Joint Replace	CS1	10 to 20
				All	Joint Eliminate	Eliminate	15 to 25

Wisconsin DOT (2016). *Bridge Preservation Policy Guide*. Ver 1.02 18p.

Participation – US State DOTs

- Preservation Actions
- Unit Costs
- Materials, Methods
- Performance Standards & Specifications
- Intervals
- Maintenance records

Schedule

Start	Nov. 2015
Phase I Planning	Mar. 2016
Phase II Catalog of Actions	Dec. 2016
Phase III Draft Guide	Apr. 2017
Phase IV Final Products	Feb. 2018

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