

# Defining Bridge Preservation

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# What is Bridge Preservation?

*Actions or strategies that prevent, delay or reduce deterioration of bridges or bridge elements, restore the function of existing bridges, keep bridges in good condition and extend their useful life. Preservation actions may be preventative or condition-driven. (AASHTO – T9)*

*... To extend the performance life of as many bridges as possible and minimize the need for costly repairs or replacement. (BIRM)*

*... Long term planning to make decisions that are cost effective in the long run. Minimizing costs over the long run while providing the desired level of service. (MBE)*



# Action Based Bridge Preservation

- Bridge actions were solicited from a number of DOT's to develop a combined listing of all bridge activities.
- The activities were categorized by where they exist on the bridge, not the nature of the activity.
- The actions covered operations, maintenance, preservation, rehabilitation, improvements and replacement.
- In total, 94 activities were defined that account for the majority of all work that can be performed on a bridge.



# Action Based Bridge Preservation

- The activities were sent to all State DOT's and many academic and industry representatives.
  - We received responses from 41 State DOT's
- Each respondent was asked to classify each action as operations, maintenance, preservation, rehabilitation/replacement or improvement.
- The results of the responses were analyzed to determine where there was clear consensus and where there was not.

# Action Based Bridge Preservation

## Decks / Approaches / Surface Items

Action	Operations	Maintenance	Preservation	Rehabilitation	Improvement	Replacement
Clean Deck Joints	7%	85%	9%	0%	0%	0%
Install Deck Protection System	0%	7%	83%	9%	2%	0%
Clean / Seal Expansion Joints	2%	70%	28%	0%	0%	0%
Seal Bridge Deck Cracking	2%	28%	66%	4%	0%	0%
Repair Deck Joints	0%	65%	22%	11%	0%	2%
Placement of a New Deck Wearing Surface	0%	11%	53%	23%	13%	0%
Replace Strip Seals	0%	52%	30%	15%	0%	2%

# Action Based Bridge Preservation

## Decks / Approaches / Surface Items

Action	Operations	Maintenance	Preservation	Rehabilitation	Improvement	Replacement
Railing Replace	2%	13%	9%	48%	13%	15%
Replace Joints	0%	13%	33%	46%	0%	9%
Mill top of Backwall / Edge of Deck	9%	44%	19%	19%	9%	0%
Approach Slab Overlay)	7%	43%	28%	11%	11%	0%
Guardrail Installation /Improvement/Rehab	4%	15%	2%	41%	37%	0%
Remove and Replace Existing Deck Wearing Surface	0%	26%	36%	36%	2%	0%
Correct Deck Drainage	4%	24%	17%	22%	33%	0%

# Action Based Bridge Preservation

## Superstructure Actions

Action	Operations	Maintenance	Preservation	Rehabilitation	Improvement	Replacement
Epoxy Inject Superstructure Cracks	0%	41%	50%	9%	0%	0%
Strengthen Superstructure	0%	0%	4%	44%	51%	0%
Patch/Repair Concrete Superstructure Spalling	2%	58%	24%	16%	0%	0%
Bridge Raise	9%	0%	2%	27%	62%	0%
Superstructure Replacement	0%	0%	0%	29%	9%	62%
Bridge Widening	2%	0%	0%	22%	74%	2%
Superstructure Rehabilitation	0%	2%	7%	89%	2%	0%
Bridge Replacement	0%	0%	0%	0%	2%	98%

# Action Based Bridge Preservation

## Superstructure Actions

Action	Operations	Maintenance	Preservation	Rehabilitation	Improvement	Replacement
Construct New Catwalks	26%	21%	5%	17%	31%	0%
Replace Gates	19%	35%	8%	24%	0%	14%
Install Bird Netting	21%	36%	38%	2%	2%	0%
Fatigue Crack Mitigation	2%	31%	47%	20%	0%	0%
Superstructure Collision Damage Repair	11%	47%	9%	31%	2%	0%



# Action Based Bridge Preservation

## Substructure Actions

Action	Operations	Maintenance	Preservation	Rehabilitation	Improvement	Replacement
Substructure Rehabilitation	0%	2%	2%	93%	2%	0%
Clean Bearings	0%	76%	24%	0%	0%	0%
Patch/Repair Concrete Substructure Spalls	2%	66%	23%	9%	0%	0%
Seismic Retrofit (Any activity designed to improve the seismic capacity of a bridge.)	0%	0%	6%	29%	65%	0%
Replace Bearings	2%	10%	10%	55%	7%	17%
Reset/Reposition Bearings	5%	55%	18%	20%	2%	0%
Replace Pins /Hangers	0%	14%	16%	51%	5%	14%

# Action Based Bridge Preservation

## Substructure Actions

Action	Operations	Maintenance	Preservation	Rehabilitation	Improvement	Replacement
Replacement of the Substructure	0%	2%	2%	49%	2%	44%
Epoxy Inject Substructure Cracks	0%	41%	45%	14%	0%	0%
Navigation Protection Repair	13%	43%	13%	28%	3%	3%
Repair Of Seismic Retrofit Components	9%	41%	12%	38%	0%	0%

# Action Based Bridge Preservation

## Culvert Actions

Action	Operations	Maintenance	Preservation	Rehabilitation	Improvement	Replacement
Clean Box Culvert Sediment	14%	80%	7%	0%	0%	0%
Clear Debris / Channel Clearing (For hydraulic capacity not debris on the substructure)	12%	74%	12%	0%	2%	0%

# Action Based Bridge Preservation

## Painting and Coating Actions

Action	Operations	Maintenance	Preservation	Rehabilitation	Improvement	Replacement
Paint Spot Prep/ Overcoat Paint	0%	26%	70%	5%	0%	0%
Paint Spot Prep/Full Paint	0%	18%	66%	16%	0%	0%
Paint - Full Prep / Full Paint	0%	12%	60%	28%	0%	0%
Wash Bridge	0%	60%	40%	0%	0%	0%
Paint Rigging/Containment	14%	21%	55%	10%	0%	0%
Railing Paint	0%	50%	43%	7%	0%	0%
Bridge Paint Identification	32%	32%	30%	5%	0%	0%

# Action Based Bridge Preservation

## Scour Mitigation Actions

Action	Operations	Maintenance	Preservation	Rehabilitation	Improvement	Replacement
Repair Washouts / Erosion	9%	66%	11%	14%	0%	0%
Repair Scour Monitoring System	18%	59%	14%	7%	2%	0%
Install Scour Monitoring System	36%	16%	27%	7%	14%	0%
Substructure Scour Mitigate (Mitigate scour risks NOT RIP RAP)	11%	13%	36%	24%	16%	0%
Install Rip Rap	5%	23%	34%	20%	18%	0%

# Action Based Bridge Preservation

## Miscellaneous Bridge Actions

Action	Operations	Maintenance	Preservation	Rehabilitation	Improvement	Replacement
Cut Brush & Remove Vegetation	14%	77%	9%	0%	0%	0%
Mechanical/Electrical Clean	14%	71%	14%	0%	0%	0%
Repair / Replace Utilities / Signs	31%	62%	0%	0%	5%	2%
Mechanical/Electrical - Rehabilitation/Upgrade	6%	11%	9%	57%	17%	0%
Provide Access for Inspection	49%	26%	7%	2%	16%	0%
Regrade Channel Under Bridge (Regrade for hydraulic capacity concerns)	10%	45%	5%	26%	14%	0%
Construct Drainage Flume	12%	38%	31%	2%	17%	0%
Install Slope Paving	7%	20%	34%	7%	32%	0%
Mechanical/Electrical - Replace	6%	29%	14%	29%	0%	23%

# Conclusions

- Actions breakdown by classification

Operations	5	5%
Maintenance	50	52%
Preservation	15	15%
Rehabilitation	17	18%
Improvement	8	8%
Replacement	2	2%

# Conclusions

- Consensus on final classification

Below 40%	12	13%	Poor Consensus
41-50%	15	17%	Moderate Consensus
Above 51%	64	70%	Good Consensus



# Conclusions

- Activities that the majority of respondents classified as preservation:

Deck Protection Systems	Deck Crack Sealing
Deck Wearing Surfaces	Joint Seal Replacement
Epoxy Injection of Cracks	Fatigue Mitigation
Bridge Painting	Scour Mitigation
Installing Rip Rap	Installing Slope Paving
Installing Bird Netting	Resetting Bearings



# Conclusions

- Formal definitions of bridge preservation cover actions considered maintenance, preservation and rehabilitation.
- Definitions of maintenance and preservation are ambiguous.
- Clear definitions of maintenance and preservation will require classifying specific bridge actions.
- Actions defined as maintenance more than triple those defined as preservation



# Questions