

Iowa DOT Bridge Preservation Manual

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Purpose of Bridge Preservation Manual

SMARTER | SIMPLER | CUSTOMER DRIVEN

- Promote the bridge preservation concept
 - What is bridge preservation
 - Why need bridge preservation
 - Provide guidelines for bridge preservation
 - Systematical way to identify and program preservation needs
 - Consistent way to do bridge preservation work
 - Based on past experience and performance data
 - Incorporate best practices and research results
 - Expecting periodical update
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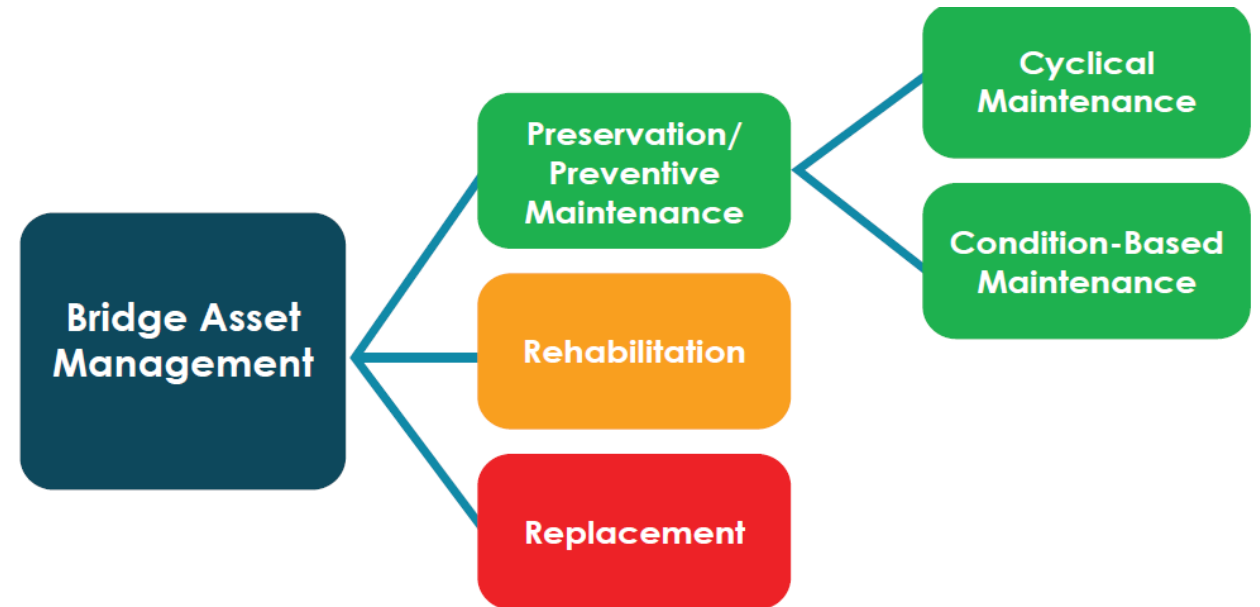


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Chapter 1, Introduction

Definitions

- **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 or fair condition; and extend their service life. Preservation actions may be cyclic or condition-driven.
- **Preventive Maintenance:**
 - A cost-effective means of extending the service life of highway bridges
- **Cyclical Maintenance**
 - Activities are performed on pre-determined intervals
- **Condition Based Maintenance**
 - Activities performed in response to known defects



Why Need Bridge Preservation

- Bridges are getting older
- Travel demands are increasing
- Costs and labor are increasing
- **Limited funding**

- Normal practice, under this circumstance, is more reactive than proactive
- “Worst-First” allows bridges in good condition to deteriorate into the deficient category.
 - Leads to a lower overall condition of bridges
 - Not cost effective
- Balanced replacement and preservation program

Solid-colored lines = With Preservation (cyclical and condition-based maintenance)
Dashed-colored lines = Without Preservation

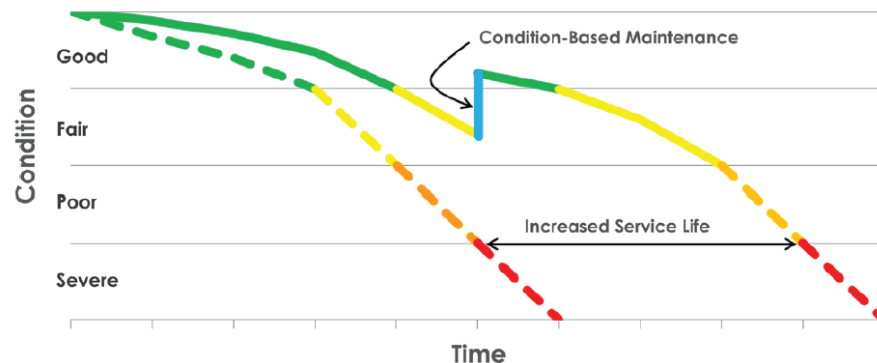


Figure 17. A comparison of bridge condition over time with and without bridge preservation.

Chapter 2, Bridge Preservation Activities, Criteria, and Cost

Deck

- Deck/drainage system washing/cleaning
- Deck sealing (flooding)
- Epoxy/polyester polymer overlay
- Rigid overlay (PCC-O, HPC-O)
- UHPC overlay
- HMA* (with membrane, Rosphalt®)
- Crack sealing
- Deck patching
- Deck patching with cathodic protection
- Epoxy injection
- Chloride extraction*

Joints

- Joint washing/cleaning/seal/repair
- Gland replacement
- Joint replacement
- Joint elimination

Superstructure

- Steel beams/girders
 - Painting/coating
 - Zone painting (beam ends and other locations)
 - Spot painting*
 - Fatigue damage prevention/mitigation
 - Cathodic protection*
- Concrete Beams (including PPCB)
 - Beam end protection/repair
 - Concrete seal/patch/repair
 - Cathodic protection*

Substructure

- Concrete repair
 - Crack seal/epoxy injection
 - Patching
 - Shotcrete
 - Installation of jacket*
 - Cathodic protection*
 - Chloride extraction*
 - Spot/Zone/Full Painting Steel Substructure*
 - Pile Preservation (jackets/wraps/CP)*
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Miscellaneous

- Barrier rail
 - Barrier rail seal
 - Rail repair
 - Install retrofit rail (typically combined with overlay, repair, or paving projects)
- Bearing
 - [Washing/cleaning](#)
 - Steel bearing lubricating
 - Bearing painting
 - Cathodic protection*
- Approach slab
 - Repair/Replace
 - HMA resurfacing
 - Joint cutting/flushing/cleaning
- Scour counter measure and slope protection (installation and repair)
- Channel Cleaning/Debris removal

Discuss Items for Each Activity

- Standard procedure or best practice
 - Criteria
 - Frequency
 - Condition
 - Target (performance measure)
 - Cost and life cycle cost analysis among alternatives
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Chapter 3, Other Bridge Preservation Considerations

Bridge Preservation at Design/Construction Stage



- New materials
 - Adoption of corrosion resistant reinforcement
 - New concrete mixture design (e.g. internal curing, etc)
 - Other corrosion resistant and/or high strength materials
 - Improved details
 - Improved construction procedure
 - 100-year service life design
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SHM for Bridge Preservation



- Heavy vehicle monitoring
- Vibration monitoring and control
- Monitoring for malignant activities
- Provide more evidences to improve bridge condition rating
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Historical Bridge Preservation



- Different goal and different preservation strategies
- Reference to Historical Bridge Preservation Manual

Chapter 4, Establish a Systematic and Data Driven Bridge Preservation Program

Current Practice



- Maintenance needs are identified by district and bridge office engineers and recorded in SIIMS
- Identified needs are assessed/prioritized annually during district meetings
- 5-year program for bridge rehab and replacement
- 3-year program for MB project

Future Practice

- Identify agency goals and objectives
- Identify bridges to preserve
- Develop a list of actions for preservation
- Establish agency rules for actions
- Develop life cycle planes using the actions
- Develop performance measures for the effectiveness of the actions to satisfy agency's goals
- Develop methods of evaluation of benefits of the actions (lower annualized cost)
- Determine availability of dedicated funds
- Implement and evaluate projects
- Monitor and measure performance of preservation program
- Reporting and improving preservation program



Source: GPI

Figure 15. Steps for establishing a bridge preservation program.

Thank You!