



# BRIDGE PRESERVATION GUIDE

November 1, 2019

# **Bridge Preservation Guide**

**Prepared and Published By  
Office of Highways Project Implementation  
Bureau of Bridges & Structures  
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## Document Control and Revision History

The Bridge Preservation Guide is reviewed during use for adequacy and updated by the Bureau of Bridges and Structures as necessary to reflect current policy. The approval process for changes to this manual is conducted in accordance with the document control standards outlined in [Departmental Order 01-01: Policy Administration Program](#) and in this manual.

This manual is intended to be used electronically as it includes hyperlinks within and resources external to the document. Portable Document Format (PDF) has been selected as the primary distribution format, and the official version of this manual is available on the [Policy Center](#) on InsideIDOT.

The information contained in this manual is current as the date of issuance. Employees are responsible for ensuring use of the most current version of any document. All current policy documents are available on the [Policy Center](#) on InsideIDOT.

Date	Description	Approval
11/1/2019	New manual	Loete

# Illinois Department of Transportation

## *Bridge Preservation Guide*

### ***Introduction***

The Illinois Department of Transportation (IDOT) Bridge Preservation Guide provides goals, measures, and strategies for the preservation of bridges within the State of Illinois. This document contains criteria used to identify condition based and non-condition based cyclical preservation, maintenance, and improvement work actions for bridges. These actions maximize system-wide life expectancy and performance of bridges.

Bridges are key components of our highway infrastructure. The term “bridge” as used here denotes structures that have an AASHTO structure length greater than 20 feet as described in the National Bridge Inspection Standards. As of April 2019, Illinois had 26,794 bridges, of which 4,805 were on the National Highway System. While IDOT maintains 29.3 % of the total bridge inventory by count, it maintains the largest percentage of the National Highway System at 84.5%. The aging infrastructure is expected to deteriorate faster in the coming decades with increased maintenance demands unless concerted efforts are taken to preserve and extend its life. In addition, the state’s bridge infrastructure will likely see increased funding competition among various highway assets. As a result, IDOT must emphasize a concerted effort to preserve and extend the life of its bridge infrastructure while minimizing long-term maintenance costs. A breakdown of the bridge inventory in Illinois is available in Appendix A for statewide totals and Appendix B for National Highway System structures only.

This guide will provide IDOT and Local Public Agency personnel a framework for developing preservation programs and projects using a systematic process that reflects the environment and conditions of bridges and reflects the priorities and strategies of the Department.

A well-defined Bridge Preservation program will enable IDOT to use federal funding for Preventative Maintenance (PM) activities by using a systematic process of identifying bridge preservation needs and its qualifying parameters as identified in FHWA’s Bridge Preservation Guide, Spring 2018. The IDOT *Bridge Preservation Guide* will promote timely preservation actions to extend and optimize the service life of bridges in the state.

### ***Definitions:***

**Acceptable Condition:** The state of structures that are in “Good” or “Fair” conditions. This is determined by the lowest of the primary condition ratings for either Deck, Superstructure, Substructure, or Culvert. Good condition structures have a primary condition rating of 7, 8, or 9. Fair condition structures have a primary condition rating of 5 or 6. Poor condition structures have a primary condition rating of 4 or less.

**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 schedule or condition based.

**Preventive Maintenance (PM):** A means of proactively extending the service life of highway bridges by applying cost-effective treatments to bridge elements. PM activities delay future deterioration and minimize large expenses in bridge rehabilitation or replacements.

**Routine Maintenance:** Any maintenance work performed in reaction to an event, season, or activity that are done for short-term operational need and do not have preservation value. This work usually

requires regular reoccurring attention. Examples include snow removal, trash/dead animal removal, asphalt patching, storm damage and accident damage such as bridge hits. These activities are not eligible for federal-aid funding.

### ***Goals of the Department's Bridge Preservation Program***

The main goal of a bridge preservation program is to maximize the useful life of bridges in a cost-effective way. To meet this goal, many of the strategies are aimed at applying the appropriate preventive maintenance treatments and activities at the proper time, resulting in longer service lives at an optimal life cycle cost. Federal Transportation Legislation (MAP-21 and subsequently, the FAST Act) promotes the goal of maintaining or preserving infrastructure assets "in a state of good repair". Preservation of assets is one of the tools that will be used to achieve an overall transportation investment strategy. There are several related goals that have been developed to address the priorities of the department and our stakeholders.

- Maintain bridges in a "state of acceptable condition" using cost effective strategies.
- Implement timely PM treatments on structurally sound bridges to promote optimal life cycle cost and extend service life. This will delay the need for costly major rehabilitation and replacement.
- Limit adverse impacts to traffic operations and various stakeholders.
- Promote and support budgeting of preventive maintenance and preservation activities.
- Establish performance goals and monitor progress related to preservation of bridges.
- Optimize the benefits and effectiveness of long-term maintenance investment in achieving bridges in acceptable condition.

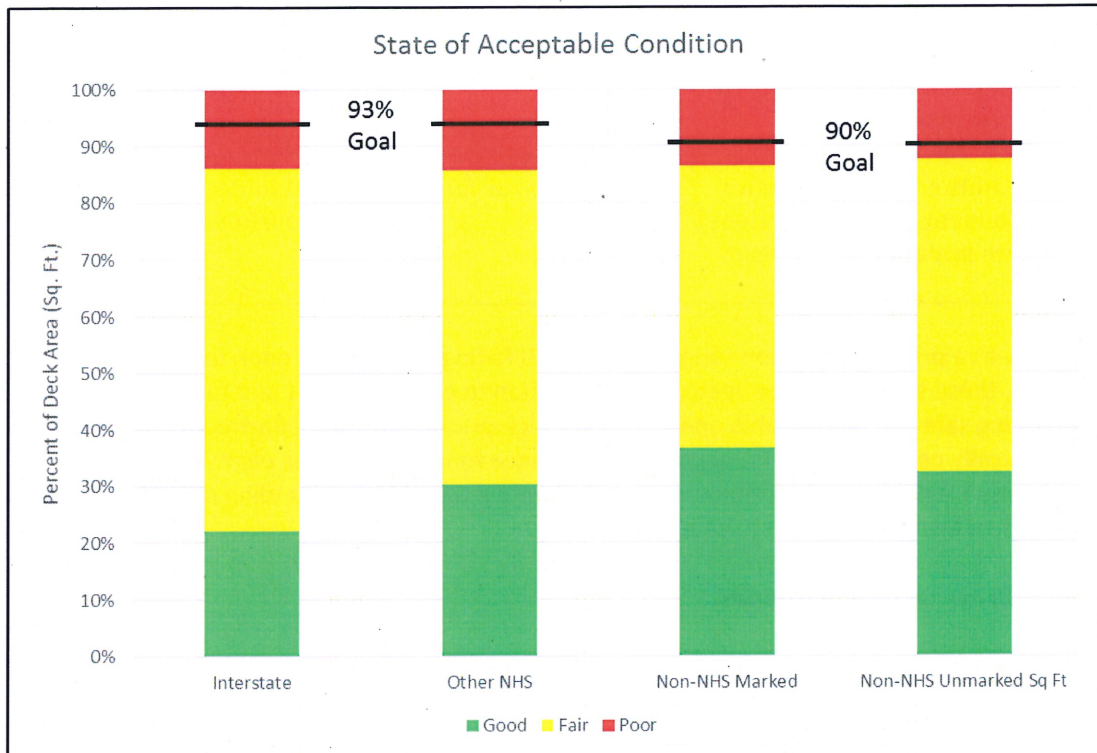
To achieve the goals of the bridge preservation program, IDOT will use data driven strategies. This approach is intended to apply the appropriate bridge preservation treatments and activities at the proper time. These strategies also intend to maximize the efficiency and effectiveness of the program. The Strategies include:

1. Regular analysis of the bridge inventory data to establish conditions and trends related to performance.
2. Develop and maintain criteria for eligible preservation activities.
3. Define preservation program and project needs.
4. Develop estimates of needed financial resources at the Project/Program level.
5. Identify preservation needs that can be performed in coordination with maintenance, repair and rehabilitation actions and timelines.
6. Prioritize, plan, and perform preservation treatments.
7. Bundle preservation maintenance projects to promote economy and minimize the inconvenience to the public.
8. Secure approval and support from key stakeholders in the use of Federal and State funding for systematic preventive maintenance and preservation activities.
9. Consider preservation and long-term durability at the bridge planning and design stages.

## Objectives and Performance Measures

Performance measures in the IDOT *Bridge Preservation Guide* are consistent with the objectives of the program and reflect the goals of the IDOT Transportation Asset Management Plan (TAMP). IDOT's Bridge Preservation Guide was developed with input from IDOT District Bridge Maintenance Engineers.

IDOT's targets, based on deck area, are to maintain 93% of the bridges on the National Highway System and 90% of the state-owned bridges NOT on the National Highway System in acceptable condition. These targets may be extended to local public agency structures, and to bridges less than 20 feet and buried structures (Box Culverts less than 20 feet) in the future.



**Figure 1: Goals and Current Performance of Bridges**

The following table shows the objectives and performance measures used to evaluate the success of the Bridge Preservation program.

**Table 1 Objectives and Performance Measures**

Objective	Target/Goals	Performance Measure
Maintain bridges in good or fair condition	93% of bridge deck area on NHS 90% of bridge deck area not on NHS	Percentage of bridge in good or fair condition (NBI rating 5 or higher)
Maintain bridge decks in condition state 2 or better (Element Level Inspections)	90% of bridge deck area	Percentage of bridge decks in condition state 2 or better (Element Level Inspections)

Maintain expansion joints in condition state 2 or better (Element Level Inspections)	90% of the overall length of expansion joints	Percentage of expansion joints (based on overall length) in condition state 2 or better
Maintain paint coatings in condition state 1 (Element Level Inspections)	90% of paint coatings	Percentage of paint coatings in condition state 1
Maintain beam ends in condition state 1 (Element Level Inspections)	90% of beam ends	Percentage of beam ends in condition state 1
Maintain bearings in condition state 1 (Element Level Inspections)	90 % of bearings	Percentage of bearings in condition state 1
Seal concrete decks in condition state 2 or better (Element Level Inspections) with sealant every 4 years	Maintain sealing of concrete deck in good or fair condition.	Number of decks sealed (sq. ft of deck area) each year during a 4- year period

Bridges with a primary condition rating of poor (NBI Rating < 5) and are open for operations are safe. However, these structures may need corrective action to ensure current and future operation. Maintaining safe and dependable operations is a high priority for the Department. These bridges, while typically not eligible for Preventive Maintenance funding, might be eligible if localized deterioration is driving the condition rating. Preventive Maintenance funding might be authorized on an individual basis after prior FHWA approval.

### ***Bridge Preservation Activities***

Bridge preservation activities are both condition-based and schedule-based, defined as follows:

- **Condition-based Activities Objectives**

Condition based preventive maintenance activities are performed on bridge elements as needed and identified through the bridge element inspection process. This typically involves elements that have deteriorated to a condition state of 3 or 4. There are several performance objectives for the bridge elements that will promote this goal.

- **Schedule-based Activities Objectives**

Schedule-based activities are typically preventive maintenance activities which are performed on a set pre-determined interval and aimed to preserve existing bridge element or component conditions. These types of activities may not improve the condition of the bridge element or component directly but will delay their deterioration.

Both types of activities will be employed in the preservation program. The ultimate objective is to increase a new structure's life expectancy to 100 years. To achieve this objective, bridges should have activities completed on the following schedule:

**Table 2 Recommended Activities Schedule**

Year	Work Activities	Criteria
0	New Bridge (Includes deck sealing within 1 year)	
Every 1 to 2 years throughout the structure's life	Sweeping, power washing and cleaning of the deck (Element Condition States 1 and 2, NBI $\geq$ 5) and drains, steel or concrete elements below deck joints, abutment and pier seats below deck joints and other areas of the bridge that collect debris and animal droppings.	
Every 4 years throughout the structure's life	Seal the deck (Element Condition States 1 and 2, NBI $\geq$ 5) *, cracks, concrete superstructure and substructure elements below deck joints, using a penetrating sealer.	
12	<ol style="list-style-type: none"> <li>1. Replace Expansion Joint Gland Seal (Element Condition States 3 + 4 <math>\geq</math>25%)</li> <li>2. Spot Painting of coated steel elements (Element Condition States 2 + 3 <math>&gt;</math>5%)</li> <li>3. Zone Painting of coated steel elements (Element Condition States 2 + 3 <math>&gt;</math>25%)**</li> <li>4. Repair/replace moveable bearings as needed (Element Condition States 3 or 4)</li> </ol>	<ol style="list-style-type: none"> <li>1. Schedule or condition based</li> <li>2. Condition based</li> <li>3. Condition based</li> <li>4. Condition based</li> </ol>
25	<ol style="list-style-type: none"> <li>1. Patch deck with hard overlay</li> <li>2. Replace Expansion Joints</li> <li>3. Zone Painting of coated steel elements</li> <li>4. Repair/replace moveable bearings as needed (Element Condition States 3 or 4)</li> </ol>	<ol style="list-style-type: none"> <li>1. Schedule or condition based</li> <li>2. Schedule based</li> <li>3. Schedule based</li> <li>4. Condition based</li> </ol>
37	<ol style="list-style-type: none"> <li>1. Replace Expansion Joint Gland Seal (Element Condition States 3 + 4 <math>\geq</math>25%)</li> <li>2. Spot Painting of coated steel elements (Element Condition States 2 or 3 <math>&gt;</math>5%)</li> <li>3. Zone Painting of coated steel elements (Element Condition States 2 or 3 <math>&gt;</math>25%)**</li> <li>4. Repair/replace moveable bearings as needed (Element Condition States 3 or 4)</li> </ol>	<ol style="list-style-type: none"> <li>1. Schedule or condition based</li> <li>2. Condition based</li> <li>3. Condition based</li> <li>4. Condition based</li> </ol>
50	<ol style="list-style-type: none"> <li>1. New Deck/Second Generation Hard Overlay (includes expansion joint replacement)</li> <li>2. Full Painting of coated steel elements</li> <li>3. Replace moveable bearings</li> </ol>	<ol style="list-style-type: none"> <li>1. Schedule or condition based</li> <li>2. Schedule based</li> <li>3. Schedule based</li> </ol>



62	<ol style="list-style-type: none"> <li>1. Replace Expansion Joint Gland Seal (Element Condition States 3 + 4 &gt;=25%)</li> <li>2. Spot Painting of coated steel elements (Element Condition States 2 or 3 &gt;5%)</li> <li>3. Zone Painting of coated steel elements (Element Condition States 2 or 3 &gt;25%)**</li> <li>4. Repair/replace moveable bearings as needed (Element Condition States 3 or 4)</li> </ol>	<ol style="list-style-type: none"> <li>1. Schedule or condition based</li> <li>2. Condition based</li> <li>3. Condition based</li> <li>4. Condition based</li> </ol>
75	<ol style="list-style-type: none"> <li>1. Patch deck with hard overlay</li> <li>2. Replace Expansion Joint</li> <li>3. Zone Painting of coated steel elements</li> <li>4. Repair/replace moveable bearings as needed (Element Condition States 3 or 4)</li> </ol>	<ol style="list-style-type: none"> <li>1. Schedule or condition based</li> <li>2. Schedule based</li> <li>3. Schedule based</li> <li>4. Condition based</li> </ol>
87	<ol style="list-style-type: none"> <li>1. Replace Expansion Joint Gland Seal (Element Condition States 3 + 4 &gt;=25%)</li> <li>2. Spot Painting of coated steel elements (Element Condition States 2 or 3 &gt;5%)</li> <li>3. Zone Painting of coated steel elements (Element Condition States 2 or 3 &gt;25%)**</li> <li>4. Repair/replace moveable bearings as needed (Element Condition States 3 or 4)</li> </ol>	<ol style="list-style-type: none"> <li>1. Schedule or condition based</li> <li>2. Condition based</li> <li>3. Condition based</li> <li>4. Condition based</li> </ol>
100	<ol style="list-style-type: none"> <li>1. Replace Bridge</li> </ol>	<ol style="list-style-type: none"> <li>1. Schedule based</li> </ol>

Reset bearings and scour mitigation as needed throughout the life of the structure.

\* In-Service decks with an NBI condition rating of 4 or less are not preservation candidates and should be maintained as needed to promote traffic safety. In-Service decks that have an NBI rating of 4 can remain in the deck sealing program on a discretionary basis. After the next deck or superstructure replacement project, the new deck will fall within these preservation activities schedule.

\*\* Based on amount of work to be done, either spot painting or zone painting can be done at these age milestones. In-house forces can be used for spot painting.

### ***Eligibility Criteria***

The preservation activities listed above will form a basis to generate an eligibility list of bridges that are candidates for schedule-based and condition-based actions. It applies to both new and in-service bridges. This list will be generated by the Bridge Management and Inspection Unit on an annual basis prior to the programming cycle and forwarded to the bridge owners.

Bridge inspection information and data stored in the Illinois Structures Information System (ISIS) will be used to develop reports quantifying needs at the program and project level.

Sound engineering judgment is needed to decide if the recommended action is best suited for extending the life of the bridge. Other factors may need to be considered in the decision-making process such as: deck age, size, deck design, and type of reinforcement, functional class, ADT, design load, detour lengths, corridor plans, and operation issues including traffic control. Specific deck/slab actions should be matched to the condition of the existing deck, deck material, age, and anticipated service life. Preservation projects may include some repair work that will raise the NBI condition rating to at least a "5" (element condition state 1 and/or 2) as long as the preservation work is  $\geq$  60% of the total cost of the project.

### ***Requirements for Use of Federal Funds for Preventive Maintenance***

The list of Federally eligible preventive maintenance activities is contained in the TAMP work activities table of the IDOT's Transportation Asset Management Plan.

AGREEMENT FOR THE USE OF FEDERAL FUNDS FOR  
PREVENTIVE MAINTENANCE OF STRUCTURES

This agreement between the Illinois Department of Transportation (IDOT) and the Illinois Division of the Federal Highway Administration (FHWA), is intended to further implement the use of Federal Aid Highway Funding for Preventive Maintenance (PM) and Preservation activities as authorized in 23 USC 116 (e), and the FHWA Memorandum dated February 25<sup>th</sup>, 2016 titled "Guidance on Highway Preservation and Maintenance" on all eligible Federal Aid Highways in the State of Illinois.

The criteria used to develop this Agreement is based on the FHWA Bridge Preservation Guide (FHWA-HIF-18-022) published in Spring 2018, which is the basis for the IDOT Bridge Preservation Guide. The IDOT Bridge Preservation Guide documents consistent and systematic criteria to identify Structure Preventive maintenance and Preservation activities that are eligible for the use of Federal-aid Highway Funded Projects.

This agreement is limited to PM and Preservation activities on Structures. This agreement includes inspection and training activities to support data driven application of Preventative Maintenance and Preservation.

By signing this agreement, IDOT and the FHWA incorporate by reference the laws, regulations, policies, standards, and procedures which govern or are applicable to Federal-Aid projects. IDOT certifies that it will comply with all provisions of 23 USC 133(b), "Surface Transportation Block Grant Program" and 23 USC 119(d) "National Highway Performance Program".

Nothing in this agreement shall be construed to relieve IDOT from ultimate accountability for compliance with Federal Laws and regulations with respect to the expenditure of Federal-Aid highway funds for PM activities in the State of Illinois, including those funds used for local government projects.

This agreement shall become effective November 1, 2019. It may be canceled or modified at any time by mutual agreement of IDOT and the FHWA.

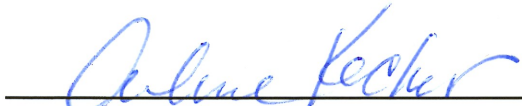
Illinois Department of Transportation



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Paul Loete, Director of Highways

Federal Highway Administration



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Arlene Kocher, Division Administrator

# Appendix A

## Statewide Structures (4-3-2019)

System	Total		Good				Poor			
	Structure Count	Square Footage	Structure Count	% Count	Square Footage	% Sq. Ft.	Structure Count	% Count	Square Footage	% Sq. Ft.
State	7,851	85,858,667	2,919	37.2%	23,826,841	27.8%	751	9.6%	12,514,948	14.6%
Toll	574	9,174,265	322		4,974,972		4		57,963	
County	4,086	13,667,715	2,128		6,263,011		334		1,223,741	
Township	12,160	20,658,848	6,709		11,699,414		1,019		1,398,982	
Muni	1,973	14,920,527	947		5,039,193		274		2,590,393	
Other	150	999,860	59		128,693		27		148,687	
Local	18,943	59,421,215	10,165	53.7%	28,105,284	47.3%	1,658	8.8%	5,419,765	9.1%
<b>TOTAL</b>	<b>26,794</b>	<b>145,279,882</b>	<b>13,084</b>	<b>48.8%</b>	<b>51,932,125</b>	<b>35.7%</b>	<b>2,409</b>	<b>9.0%</b>	<b>17,934,714</b>	<b>12.3%</b>

\*Illinois Bridge Inventory Statistics 4-4-2019-The lowest of the primary condition ratings for either Deck, Superstructure, Substructure, or culvert are used to define the Good, Fair, Poor categories. Good condition structures have a primary condition rating of 7, 8, or 9. Fair condition structures have a primary condition rating of 5 or 6. Poor condition structures have a primary condition rating of 4 or less.

# Appendix B

## NHS Structures (4-3-2019)

System	Total		Good				Poor			
	Structure Count	Square Footage	Structure Count	% Count	Square Footage	% Sq. Ft.	Structure Count	% Count	Square Footage	% Sq. Ft.
State	4,062	59,344,177	1,314	32.3%	14,867,075	25.1%	390	9.6%	9,078,866	15.3%
Toll	447	7,618,964	254		4,059,445		2		33,454	
County	80	837,722	39		162,116		7		114,581	
Township	0	0	0		0		0		0	
Muni	212	5,637,037	53		1,565,532		33		893,658	
Other	4	111,466	0		0		1		4,680	
Local	743	14,205,190	346	46.6%	5,787,093	40.7%	43	5.8%	1,046,373	7.4%
<b>TOTAL</b>	<b>4,805</b>	<b>73,549,367</b>	<b>1,660</b>	<b>34.5%</b>	<b>20,654,169</b>	<b>28.1%</b>	<b>433</b>	<b>9.0%</b>	<b>10,125,239</b>	<b>13.8%</b>

NOTE: NHS - National Highway System

\*Illinois Bridge Inventory Statistics 4-4-2019-The lowest of the primary condition ratings for either Deck, Superstructure, Substructure, or culvert are used to define the Good, Fair, Poor categories. Good condition structures have a primary condition rating of 7, 8, or 9. Fair condition structures have a primary condition rating of 5 or 6. Poor condition structures have a primary condition rating of 4 or less.