

# JOINT TRANSPORTATION RESEARCH PROGRAM

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## Bridge Preservation Treatments and Best Practices

### Introduction

Highway bridges constitute vital links in any transportation system. At present more than 50% of the bridge national inventory (BNI) has exceeded a 50-year service life, and 25% of the existing bridges are rated as structurally deficient or functionally obsolete. The number of structurally deficient bridges will be likely to continue increasing if measures are not implemented to reduce the rate of the deterioration process. Department of Transportation (DOT) agencies nationally have to deal with consistently increasing bridge preservation and replacement needs, while often faced with constrained or reduced budgets every year. A bridge preventive maintenance program has been shown to be a very efficient way to preserve and extend bridge service life.

A bridge preventive maintenance program is related to a routine practice that is repeated with some particular frequency to obtain the best results. Moreover, it is well known that when it is possible to perform cheaper preventive maintenance activities, with more frequency, this results in a more efficient alternative than performing fewer expensive repairs/rehabilitation or even replacements of bridge elements. To address the continued deterioration of Indiana highway bridges requires the development of a cost-effective strategy to deal with increasing bridge maintenance, rehabilitation, and replacement expenses. Bridge preventive maintenance activities can prolong the life of Indiana bridges by consistently using simple, economical treatments at strategic points in a structure's life cycle.

### Findings

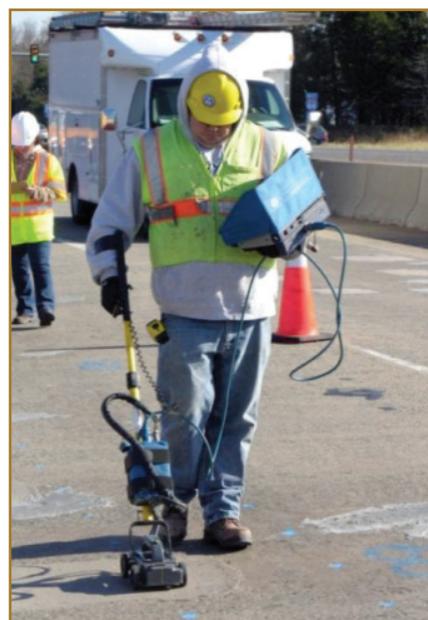
The objective of this research was to review bridge maintenance activities recommended by specialized literature and to examine those maintenance activities currently conducted by the various Indiana Department of Transportation (INDOT) districts, as well as maintenance activities performed by several other DOT agencies. Based on the results of this review, a list of ten new and enhanced bridge preventive

maintenance activities was identified to improve the effectiveness of bridge maintenance operations in Indiana. The required conditions and frequency to perform each activity was analyzed, and the cost and benefit of such operations was studied to ensure that the proposed activities are economically feasible and sustainable. Based upon the analysis, all ten preventative maintenance activities were found to be cost effective and are recommended as an effective means of bridge preservation.

### Implementation

The list of the ten bridge preventive maintenance activities and sub activities proposed to be implemented by INDOT includes the following operations:

1. Clean and sweep the bridge deck every year; wash and flush the drainage system from the deck annually; and flush the deck before sealer application.
2. Seal concrete deck cracks using a sealer according to the type of cracks; seal the deck with a penetrating



silane-based, hydrophobic sealer and patch small pot-holes. Repeat this procedure every five years.

3. Clean and flush deck joints annually.
4. Clean and wash elastomeric and steel bearings and seats every two years; lubricate steel bearings every four years; and spot paint steel bearings every ten years.
5. Clean and sweep approach slabs annually; wash and flush the slab approach drainage system annually; seal slab and cracks in conjunction with concrete deck; and clean and flush slab joints annually.
6. Clean and wash steel superstructure every two years.
7. Apply spot painting to all superstructure steel elements every ten years.
8. Provide vegetation control annually.
9. Perform tree and debris removal from piers and abutments annually.
10. Clean and flush pin and hanger connections every two years; clean and flush the expansion joints located over the pin and hanger connections annually; lubricate the contact surfaces in a pin and hanger connection every four years; and spot paint pin and hanger members every ten years.

The performance of many of these bridge maintenance activities will likely require the use of crews and equipment. The sequencing and scheduling of activities is left to the district personnel who will complete the required maintenance in a timely fashion to optimize the use of their personnel and resources.

INDOT should implement the methodology guide presented in Appendix G to the report, where basic information is provided to perform each of the aforementioned maintenance activities. Included for each activity is a description of materials and labor needed to perform the maintenance, basic procedures, and associated safety measures.

Following the best practices from other DOT agencies, INDOT should incorporate a Technical Training Program to provide skills and practices in performing the recommended maintenance activities. Practical training that provides both basic theoretical background together with on-the-job practices will provide maintenance personnel with adequate knowledge and expertise to significantly improve the condition of the bridge inventory.

## Recommended Citation for Report

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