

# MOUNTAIN-PLAINS CONSORTIUM

RESEARCH BRIEF | MPC 23-504 (project 533) | September 2023

## Life-cycle Cost Implications of Alternative Bridge Inspection Planning



### the **ISSUE**

Routine bridge inspections in the United States are primarily conducted via visual inspection on a fixed two-year cycle. Although this strategy has generally produced a safe bridge network, there is a need for an enhanced inspection planning process that could use inspection resources more efficiently, consider the importance and risk associated with structures, and incorporate a nondestructive evaluation.

### the **RESEARCH**

This research proposes a new framework for planning inspections based on the concept that an inspection should only be performed when knowledge about bridge condition is uncertain. The report describes the framework, then applies the framework to an example bridge considering the deterioration modes of chloride-induced corrosion in the rebar and fatigue cracking of a steel connection. A new inspection plan is developed, and the life-cycle costs associated with the new inspection plan and a traditional inspection schedule are computed and compared.



A University Transportation Center sponsored by the U.S. Department of Transportation serving the Mountain-Plains Region. Consortium members:

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North Dakota State University  
South Dakota State University

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University of Denver  
University of Utah

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### Project Title

Use of Life Cycle Cost  
Analysis to Enhance  
Inspection Planning for  
Transportation Infrastructure

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## the FINDINGS

The research demonstrates that, although nondestructive evaluation methods may be too expensive to use on a routine two-year inspection cycle, a novel inspection planning strategy allows for these more detailed inspections to be cost effective while providing the information needed to make decisions to keep bridges safe.

## the IMPACT

The uncertainty-based bridge inspection planning framework developed in this research is a novel planning approach that offers a multitude of advantages. It provides flexibility to adapt inspection schedules, optimizes resource allocation, mitigates risks, and leads to cost savings. Furthermore, it encourages long-term planning, data-driven decision-making, and adaptive management, ultimately improving safety and environmental considerations. This approach enhances public confidence in bridge infrastructure by demonstrating a commitment to proactive maintenance and resilience. This inspection planning framework helps to conduct bridge inspections only when needed, which will save resources and, with the specialized inspection tools, provide the most useful information.

For more information on this project, download the Main report at <https://www.ugpti.org/resources/reports/details.php?id=1157>

For more information or additional copies, visit the Web site at [www.mountain-plains.org](http://www.mountain-plains.org), call (701) 231-7767 or write to Mountain-Plains Consortium, Upper Great Plains Transportation Institute, North Dakota State University, Dept. 2880, PO Box 6050, Fargo, ND 58108-6050.



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