

Development and Demonstration of Fleet Management Strategies for Timber Bridges

Bridge management is a daunting task. With so many bridges and limited budgets, bridge owners must constantly make tough decisions about how, when, and where to allocate funds. These decisions are often made without the “best” information possible, usually because of the additional cost of getting the best information. However, difficulties associated with managing a large number of functioning assets are neither new nor specific to civil infrastructure. Other industries, such as the trucking and aircraft industries, have successfully employed management strategies based in part on the best information available and in part upon statistical extrapolation of that information.

Background

With more than 600,000 bridges in the United States, nearly 30% of which are classified as structurally deficient or functionally obsolete, bridge owners are faced with an increasingly complex management problem. At the same time, when tested, most bridges exhibit characteristics that are better than those predicted by codified approaches. In some cases, performance can be up to 100% better. Bridge owners have limited financial resources and need to optimize system preservation activities through enhanced management approaches that take advantage of structural similarities and better performance indicators. A fleet management system based on these principles will provide data for more accu-



Glued laminated girder bridge.

rately understanding bridge-specific behavior. This offers the potential for basing management decisions on behavior-based evaluations of a bridge fleet rather than on code-evaluated individual bridges. General similarities in construction offer the potential to apply fleet management approaches to timber bridges typically found on local system roadways.

Objective

The overall objective of this work is to apply fleet management strategies to timber

bridges (each fleet of bridges has similar geometrical, material, and behavioral characteristics). Specific objectives include identifying information needed to adapt and implement fleet management strategies, developing an implementation plan for fleet management strategies, and illustrating the viability of fleet management strategies.

Approach

The first portion of the study will focus on conducting a literature review and collecting information on the application of fleet management techniques in other industries. Several different populations of bridges (fleets) with similar critical behaviors will be identified, and a specific fleet of bridges will be selected as the primary subject of this study. This portion of the study will provide a basic framework for fleet management concepts and the identification of a specific bridge group.

The second portion of the study will focus on performing detailed analytical, experimental, and inspection evaluations of the bridges selected in the first part of the study. This will consist of inspection of a “large” number of bridges, field testing of a “medium” number of bridges, and detailed analytical study of a “small” number of bridges. The statistical relationship between bridge characteristics with codified assessments will be developed to identify independent variables, and procedures will be developed for relating independent variables to the results of the more rigorous evaluations.

The final portion of the study will focus on preparation of a final report. The final report will document all aspects of the research. A critically important part of the final report will be recommendations for further implementation of fleet management strategies.

Expected Outcomes

This study will result in recommendations for widespread implementation of fleet management strategies for bridges. Recommendations are expected to consist of information related to sample size requirements, testing and analytical requirements, and procedures for information collection and analysis.

Timeline

The literature review and identification of preliminary fleet management concepts will be completed by late 2005. Potential bridge fleets will be identified by the end of 2005, and a specific fleet will then be selected for more rigorous investigation. Field testing will be completed by summer 2006, and rigorous analytical investigation will be completed by the end of 2006. The final report will be completed by July 2007.

Cooperators

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