

## **Life-Cycle-Cost (LCC) Model for the Design of a Bridge Vibration Monitoring System (BVMS)**

**Ahsan Zulfiqar, Miryam Cabieses, Namra Khan, and Andrew Mikhail**

George Mason University (GMU)

Corresponding author's Email: [azulfiqa@masonlive.gmu.edu](mailto:azulfiqa@masonlive.gmu.edu),

*The views expressed herein are those of the author and do not reflect the position of the United States Military Academy, the Department of the Army, or the Department of Defense.*

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**Abstract:** The Federal Highway Administration must evaluate and inspect 607,380 bridges bi-annually to ensure compliance with safety standards designed to minimize bridge failures. This process is currently done manually - a time consuming and costly process. The current bi-annual cost to inspect all bridges is \$2.7 billion and each bridge requires 1-3 days for on-site inspection, depending on the complexity of the bridge. As the age of bridges increases, there is an increase in maintenance cost as well as an increase in the frequency of the inspection cycle from 2 years to 6 months. Advances in technology provide an opportunity to reduce the cost by 23.7%-26.0%, and improve the quality of bridge inspections by migrating from a periodic manual bridge inspection paradigm (e.g. once every 2 years or less) to an event-based inspection (e.g. inspect only when needed). In this paper, we will propose an Event-Based inspection system that will detect defects prior to the periodic inspections ultimately, reducing the exponential growth of defects and the total cost of bridge inspections.