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Deployment of Structural Health Monitoring of Bridges in the State of Iowa: Strategic Plan and Demonstration

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Abstract

The use of structural health monitoring (SHM) has gained wide popularity in various fields during the most recent decades. Since 2000, the Iowa DOT has funded several research projects with the goal of developing and evolving an autonomous SHM system that could be widely used on highway bridge structures to assess the safety and remaining life of bridge structures. Many of these projects have been completed in cooperation with the Bridge Engineering Center (BEC) at Iowa State University (ISU). Given the maturity and proven effectiveness of the developed SHM system, the timing is favorable for the Iowa DOT to implement a long-term, statewide bridge SHM program. It was proposed that a holistic bridge preservation plan should be established integrated with the real-time SHM data. Critical elements on a bridge can be evaluated using real-time data instead of generally expected behavior, thus making unique bridge-level decisions. Furthermore, the real-time data can identify irregularities on the bridge (such as fatigue cracks or a bad bridge bearing), and alert bridge engineers that the bridge is performing differently.

The objectives of this project are to 1) create, propose, and refine a plan for the SHM deployment in Iowa; and 2) demonstrate the proposed deployment guideline on select bridges in Iowa.

The steps to complete these objectives will be covered and various SHM projects, both past and present, will be highlighted.