



## Florida Department of Transportation Research

### Integrative Information System Design for Florida Department of Transportation: A framework for structural health monitoring of movable bridges

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Many bridges that span waterways have decks which move to allow the passage of boats. The smooth flow of land and water traffic depends on the safe, efficient operation of these bridges. However, constant use causes wear on bridge mechanisms, which can result in damage and breakdowns that halt traffic. Visual inspection is the most common method of evaluating the condition of bridge structures. Its drawback is that damage is often well established before it becomes visible. A monitoring system able to track conditions on all areas of the bridge could show where maintenance is needed before severe damage occurs.

FDOT contracted with the University of Central Florida to develop a structural health monitoring (SHM) system for bridges. Researchers obtained and analyzed a wide range of information about common movable bridge problems. A 25-year range of data from a single representative bridge was used to create a simulated bridge for modeling structural



*The bascule bridge at SE 17th Street in Fort Lauderdale serves a busy access route for sea-going vessels.*

responses under different conditions. The model was field tested and verified with experiments performed at the selected bridge.



*The Sunrise Boulevard bridge in Fort Lauderdale will be instrumented to explore the feasibility of the concepts developed in this study.*

Researchers then proposed a design for an integrated sensor network able to acquire, record, and transmit data on bridge operations. Evaluation of the proposed design showed that the SHM should be able to track and evaluate operating incidents and anomalies, as well as deterioration and damage to the bridge structure and mechanics. The data can be analyzed to determine causes and predict future behavior. It is anticipated that SHM will be able to mitigate bridge problems and reduce maintenance costs. Follow-on research is being conducted to pilot test the system.

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