Arkansas State Highway and Transportation Department
Transportation Research Committee

RESEARCH PROBLEM STATEMENT

DATE: 08/27/2010	**PROJECT AREA:** Maintenance

TITLE: Development and Evaluation of a Passive Corrosion Sensor for Bridges

PROBLEM STATEMENT:

Corrosion can be a significant problem leading to damage and deterioration of existing bridge structures. If corrosion in bridges is not mitigated, it will eventually lead to various serviceability problems and increased maintenance costs. In some cases, undetected and unchecked corrosion can eventually lead to safety problems, particularly for prestressed or post-tensioned concrete structures. Detecting the onset of corrosion and characterizing its progression is particularly challenging for steel elements that are embedded in concrete or otherwise obscured for routine visual inspection. Corrosion sensors can permit the corrosion of such elements to be detected and characterized enabling more timely mitigation efforts to be implemented. Passive corrosion sensors may be particularly useful for applications with bridge structures as they don't require a dedicated power source or signal wires to interrogate them. Power and communication with these sensors (even when embedded in concrete or obscured by other materials) is facilitated in a wireless sense through inductive coupling with an secondary reader coil that is held above the corrosion sensor's location. The corrosion sensor is very simple and inexpensive technology, and a single portable reader coil can be used to interrogate all of the installed corrosion sensors on an as-needed basis.

OBJECTIVES:

The objectives of the proposed project are to: (1) identify existing passive corrosion sensors in the literature and identify the most promising designs, (2) design and construct a passive corrosion sensor and evaluate its detection and characterization capabilities for laboratory specimens containing steel bars or strands embedded in concrete and for steel strands obscured by steel or polymer cover materials found in stay cables and their anchorages; (3) evaluate the interrogation distance capabilities of the reader coil for different sensor embedment depths and for different stay cable cover materials.

Form of Research Implementation:

A final report will document all passive corrosion sensor designs evaluated in the project and the results of their laboratory testing. A recommended passive corrosion sensor design or designs will be provided for steel bars or strands embedded in concrete, and for bridge cable stays.

Total Estimated Cost and Project Duration: **$** 96,000 **and** 24.00 **months.**

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ADVISORY COUNCIL RANKING	TRC RANKING	Statement Combined with Statement Number(s)
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