

## **I – Problem Statement Title (04-GS023)**

### **Improved Design and Construction Specifications to Minimize Bridge Deck Rehabilitation and Maintenance Costs**

## **II – Research Problem Statement**

**Question: How can we minimize bridge deck rehabilitation and maintenance costs, considering that deck rehabilitation is the largest maintenance related expenditure?**

Develop design and construction specifications for bridge decks in concrete highway bridges. Currently, there is 300 million dollars of deck maintenance or rehabilitation work identified. The recommendations range from methacrylate applications to deck replacements. The reasons for bridge deck cracking include shrinkage and temperature-related effects (early age cracking), restraints from the girders and the bents, and live load related effects (long-term cracking). Design and construction changes may reduce the problem and help to extend the life of bridge decks.

## **III – Objective**

The objective of this research is to develop guide specifications covering the design and construction of bridge decks (both box-girder bridges and “T” girder bridges). These specifications should be developed through a combination of analytical and experimental investigations and be prepared in both LFD and LRFD format. Additionally, design examples and details should be developed to illustrate the application of these guide specifications.

## **IV – Background**

Over 2,000 (out of nearly 12,000 State bridges) have been identified as needing deck maintenance and repairs. While a large number of these bridges are over 30 years old, a few of these bridges are less than 10 years old. It is estimated that over 1 billion dollars will be needed to maintain or rehabilitate these bridge decks over the next 15 years.

## **V – Statement of Urgency and Benefits**

### **A. Support of the Department’s Mission/Goals:**

**(Improving Mobility: Safety and Reliability)** Nearly 2,000 of the 12,000 bridges in the State have been identified for deck rehabilitation or replacement. During either maintenance or replacement, the traffic has to be either staged or re-routed leading to significant traffic delays and other associated indirect costs. By developing new procedures for deck design that will enable reduced frequency of maintenance and increased service life, such delays can be significantly reduced.

**B. Return on Investment:**

Costs associated with bridge deck rehabilitation or replacement are estimated to be about a billion dollars over the next 15 years. Through developing new procedures for deck design and construction frequency of maintenance can be significantly reduced. In addition to huge cost savings due to reduced maintenance, other benefits such as reduced life-cycle costs and reduced delays can be realized.

**VI – Related Research**

A similar FHWA research has been proposed, but this research focuses on the bridge deck cracking as it relates to structure type only. The status of this project is unknown.

The most important aspects of this proposed research are not only instrumenting bridge decks, but to be able to assess and interpret the results of monitoring over a period of time.

**VII – Deployment Potential**

As a result of this research, new design and construction specifications for bridge deck construction will be developed. These specifications will lead to improved performance of the California highway bridge system and eliminate potential repair costs.