SHRP2 SOLUTIONS
TOOLS FOR THE ROAD AHEAD

# Nondestructive Testing for Concrete Bridge Decks (R06A)

***Better, faster methods for determining concrete bridge deck conditions***

## Challenge

The number of concrete bridge decks in poor structural condition is one of the biggest problems affecting bridges in the United States. Evaluating bridge deck conditions becomes increasingly critical as highway agencies work to optimize the effective timing, scope, and approaches for preventive maintenance, repair, and replacement.

Normal chain dragging, hammer sounding, and visual methods of identifying concrete bridge deck deficiencies do not accurately and safely provide the needed information to adequately maintain concrete bridge decks. Nondestructive testing (NDT) techniques have the potential to quickly and reliably provide the needed information about under-the-surface conditions of bridge decks, but independent evaluations are needed to determine their best use and to validate their effectiveness under a variety of conditions.

## Solution

The web-based, open-source NDToolbox helps identify and characterize testing technologies that are available to locate the primary deficiencies in concrete bridge decks. With the toolbox, users can explore different NDT technologies and examine their use in detecting deterioration for conditions relevant to the project. The NDToolbox describes the technology and the physical principle behind it, applications, performance, limitations, equipment, test procedures and protocols, and sample results. It also provides recommendations regarding the best technologies for a particular deterioration detection application.

The accompanying report identifies the four most common types of deterioration affecting concrete bridge decks, and the corresponding NDT techniques that are best suited to locating and identifying the deterioration. Based on their overall value in detecting and characterizing deterioration in concrete decks, the top technologies were ground-penetrating radar, impact echo, and ultrasonic surface waves. The report and web tool provide clear information about the advantages and limitations of each technology. However, the ultimate decision about which equipment to acquire and which technology to use is dependent on the type of deterioration that is of highest concern to the agency, and whether the evaluation is being done for network-level condition monitoring or for project-level maintenance or rehabilitation.

## Benefits

Comprehensive and accurate assessments of concrete bridge decks can reduce the frequency of detailed regular and follow-up inspections. This can reduce the number of congestion-related traffic interruptions, which, in turn, can provide shorter durations and frequencies of work zones during testing operations. In addition, a number of NDT technologies can generate data at production rates that are comparable to the current practice of chain dragging and hammer sounding. The cost of these techniques is also approaching traditional testing values.

### *Save Lives*

***Minimizes the likelihood of bridge failures from unrecognized bridge deck deterioration. Creates safer conditions for workers because of shorter exposure in work zones.***

### *Save Money*

***Provides options for cost-effective evaluation of bridge deck deficiencies.***

### *Save Time*

***Extends the life of concrete bridge decks through appropriate and timely maintenance treatments.***

RENEWAL

**One of four SHRP2 focus areas, Renewal products help transportation organizations rapidly build and restore highway infrastructure that lasts longer while minimizing user disruption and delay.**

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**Visit: www.fhwa.dot.gov/GoSHRP2**
**Learn more about products, case studies, and implementation assistance.**

## The Implementation Assistance Program

Implementation assistance is available to help State departments of transportation (DOTs), metropolitan planning organizations (MPOs), and other interested organizations deploy SHRP2 Solutions. A range of opportunities is available to raise awareness of SHRP2 Solutions and to encourage early adoption of these products. Application periods are offered approximately twice per year. Each product selected for implementation assistance has the potential to deliver more efficient, cost-effective programs to meet the complex challenges facing transportation today.

## How can you learn more?

Visit: www.fhwa.dot.gov/GoSHRP2

- Additional product information
- Information about how this product is being used in the field
- Contact information for peers who are familiar with this product
- Links to research reports

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### About SHRP2 Implementation

The second Strategic Highway Research Program (SHRP2) is a partnership of the Federal Highway Administration (FHWA), the American Association of State Highway and Transportation Officials (AASHTO), and the Transportation Research Board (TRB). TRB completed the research, and now FHWA and AASHTO are jointly implementing the resulting SHRP2 Solutions that will help the transportation community enhance productivity, boost efficiency, increase safety, and improve the reliability of the Nation's highway system.