SHRP2 SOLUTIONS
TOOLS FOR THE ROAD AHEAD

# Prefabrication Can Be a Cost-effective Answer for Thousands of Bridges in Need of Replacement

## *A standardized approach to prefabricated bridge elements opens the door to local builders and smaller agencies*

The nation's aging bridge inventory, increased traffic congestion, and work-zone safety concerns call for new approaches to traditional sequential "construct-in-place" methods. The industry must find smarter, faster ways to replace bridges using techniques that will provide economies of scale in manufacturing and construction, reduce traffic disruption, and increase safety.

Prefabricated bridge elements have been used in a number of states, but to date, each design is unique and requires a high level of engineering and construction oversight. **This toolkit provides standard design details, specifications, and a guide manual to enable any bridge owner to use prefabricated elements to accelerate bridge replacements more cost-effectively.**

The toolkit was developed through the second Strategic Highway Research Program (SHRP2). It sets in place a standard design that can be used to create standard prefabricated elements that could become readily available and increasingly cost effective with repeated use.

*Bridge Designs for Rapid Construction*

### Changing the project delivery model for replacing small- to medium-sized bridges

FOCUS AREA: Renewal (R04)

Design toolkit, standard plans, and examples for prefabricated bridge projects to accelerate construction.

### Save Money

Toolkit opens the door to local contractors, increasing competition.

Standardization of prefabricated elements holds the potential for vast cost savings.

### Save Time

Reconstructing bridges with prefabricated elements significantly reduces construction time and minimizes or eliminates traffic impacts.

## The Solution

The *Innovative Bridge Designs for Rapid Renewal* (R04) product provides state and local departments of transportation with a design toolkit for prefabricated bridge projects. Standardized approaches streamline the activities required to get bridge replacement systems designed, fabricated, and erected in less time, and installed in hours or days, rather than weeks or months. It includes standard design plans for foundation systems, substructure and superstructure systems, subsystems, and components that can be installed quickly with minimal traffic disruptions. It provides design detail standards and design examples for complete prefabricated bridge systems. Although this toolkit does not eliminate the need for an engineer of record, it does make prefabrication design accessible to many more bridge owners at the state, county, and local levels.

Photo Credits: Iowa DOT / HNTB

## The Benefits

- The toolkit capitalizes on the benefits of bridge prefabrication for rapid, cost-effective replacement of the thousands of small- to medium-sized deficient bridges across the country.
- Smaller agencies with fewer resources can use this toolkit to deliver prefabricated bridge construction.
- Prefabricated construction can be performed by local contractors, increasing competition and decreasing cost.
- No special equipment or construction techniques are required to use this toolkit.
- The toolkit can support the development of standardized prefabricated bridge elements, including substructure, superstructure systems, and foundations.

## Who is using these tools?

States across the country are currently seeing the benefits of using *Innovative Bridge Designs*. Here are just a few examples:

- The Gila River Indian Community (GRIC) DOT in **Arizona** replaced an aging four-span bridge with a two-span prestressed girder bridge over the Gila River. The project used the R04 toolkit, which shortened the road closure from the expected 4-6 months to just 11 days.
- An existing steel culvert in **California** was replaced with a new precast concrete bridge over Goff Creek using the toolkit and accelerated bridge construction (ABC) techniques.
- Two small stream crossing bridges in **Kentucky** were replaced using ABC techniques. The contractor was able to close the road for less than three weeks, saving time and money for bridge users.
- By using precast elements in **Michigan** during freezing weather, contractors were able to avoid environmental damage from heavy equipment.
- An existing bridge was replaced on Route B over Loop 70 in Columbia, **Missouri**. By using ABC techniques, the project saved several weeks of construction compared to more traditional methods.
- A bridge In Providence, **Rhode Island**, was replaced in only 21 days compared to 330 days for a similar project using traditional methods.
- Five bridges in **Wisconsin** were replaced using an accelerated precast pier technique. The precast approach saved approximately three weeks of construction and decreased safety risks.

### How can you learn more?

For more information, contact Jamal Elkaissi at FHWA, jamal.elkaissi@dot.gov; or Patricia Bush at AASHTO, pbush@AASHTO.org. For helpful tools and information on this product, visit: http://shrp2.transportation.org/Pages/Bridge-Designs-for-Rapid-Renewal.aspx. Updates on the SHRP2 program can be found at www.fhwa.dot.gov/GoSHRP2 or http://SHRP2.transportation.org.


**About SHRP2 Implementation**

The second Strategic Highway Research Program is a national partnership of key transportation organizations: the Federal Highway Administration, the American Association of State Highway and Transportation Officials, and the Transportation Research Board. Together, these partners conduct research and deploy products that will help the transportation community enhance the productivity, boost the efficiency, increase the safety, and improve the reliability of the Nation's highway system.

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