

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

The Solution

The *Bridge Designs for Rapid Renewal* 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.

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 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?

The Iowa Department of Transportation (DOT) conducted the first pilot project of these methods in 2011, with the replacement of a bridge on US 6 over Keg Creek near Council Bluffs, Iowa. The replacement structure is a three-span steel/precast modular bridge with precast bridge approaches. The bridge was demolished and replaced within 14 days using the standard plans developed as part of this project. These innovative bridge elements were showcased as part of the pilot:

- ▶ Prefabricated superstructure module: precast concrete deck on steel stringers
- ▶ Prefabricated substructure components: precast pier columns and caps and abutment stem and wing walls
- ▶ Prefabricated bridge approach: precast concrete panels and sleeper slab

The Vermont Agency of Transportation will go to construction this winter on the first of two bridges designed using the toolkit. Five additional bridges are in project development.

In 2013, the New York State DOT will pilot the application of lateral slide methods and concepts on a bridge replacement on I-84. These new concepts will be added to the ABC Toolkit and published in a future edition.

How can you learn more?

The report, *Innovative Bridge Designs for Rapid Renewal*, which includes research from the Keg Creek project, is available on the web at <http://www.trb.org/Main/Blurbs/167693.aspx> and *Innovative Bridge Designs for Rapid Renewal Toolkit* is available online at <http://www.trb.org/Main/Blurbs/168046.aspx>. The toolkit will be updated next year to reflect the experiences of the New York and Vermont pilot projects. For more information, contact Matt DeMarco at FHWA, matt.demarco@dot.gov; or Patricia Bush at AASHTO, pbush@AASHTO.org. A video of construction using these techniques can be viewed online at http://www.trb.org/StrategicHighwayResearchProgram2SHRP2/Pages/ABC_for_Everyday_Bridges_618.aspx.

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.

Strategic Highway Research Program

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