

Innovative Bridge Designs for Rapid Renewal: The ABC Toolkit and Its Implementation

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For the past eight years, the second Strategic Highway Research Program (SHRP2) project has been assisting state departments of transportation (DOTs) through an innovative product called the *SHRP2 Report S2-R04-RR-2: Innovative Bridge Designs for Rapid Renewal: ABC Toolkit*. The activities promoting and educating state DOTs about this toolkit have been valuable and well received.

Designed to help states implement accelerated bridge construction (ABC) techniques, the ABC toolkit provides step-by-step design guides, suggested construction specifications, techniques, and recommendations on how a transportation agency might accelerate the replacement of existing bridges. Techniques suggested in the toolkit include prefabricating bridges off site, or, in some cases, sliding bridges in from the side; both of these methods can limit roadway closures to less than one day. The toolkit includes best practices from around the United States and showcases various ABC methods tested by eight “SHRP2 lead adopter” agencies in 2014–2015. During that period, showcases and three peer exchanges were held, with participants from all 50 states and the District of Columbia. The showcases gave the lead adopter states a chance to highlight their bridge projects and lessons learned when applying the ABC toolkit. The peer exchanges offered transportation agencies at the state, federal, and local levels opportunities to share and learn from each other’s experiences incorporating ABC into their routine practice by developing standard details, framework charts, cost-estimating spreadsheets, and design and construction specification manuals.

One-Day Training Courses

An important component of the SHRP2 ABC project is a one-day training course, which covers all aspects of ABC, from planning to design, procurement,

and construction. Lessons learned are presented from the perspectives of owners, designers, and contractors.

In 2016 and 2017, the training course was held in the following 16 states and U.S. territories: Arkansas, Delaware, Florida, Illinois, Iowa, Louisiana, Michigan, Montana, Nebraska, New Jersey, New Mexico, Pennsylvania, Puerto Rico, South Carolina, South Dakota, and Wisconsin.

A second round of 19 training courses is currently underway. Training courses in this round are confirmed or unconfirmed in the following states: Arizona, California (two sessions), Colorado, Connecticut, Hawaii, Idaho, Indiana, Maine, Maryland, Minnesota, New Hampshire, Oklahoma, Oregon, Pennsylvania, Texas, Virginia, West Virginia, and Wyoming.

In each SHRP2 ABC training course, participants are introduced to the concepts of ABC, with special emphasis on the benefits and advantages of considering ABC. The training course covers prefabricated bridge elements and systems (PBES) along with bridge move-in technologies. Time is spent on the SHRP2 R04 toolkit coverage of the development of the different ABC processes, and special attention is given to ABC methods successfully used in previous projects.

The afternoon session features presentations from two demonstration projects that have implemented the SHRP2 R04 toolkit methods, along with information on the eight state DOT implementation projects supported by SHRP2. Lessons learned from these projects are presented, including feedback from the state DOTs about ABC experiences.

The final part of the training course covers procurement issues, costs and

savings considerations, and contractor perspectives about ABC. The class finishes with a “tour” of state ABC projects. These projects are gathered from the 42 states that attended the three peer-to-peer exchanges hosted in 2015. The wide range of ABC topics stimulates excellent discussion and questions from class participants.

Lessons Learned During the Training Sessions

Each host state for a one-day training course is invited to present ABC-related activities that the state has completed or is in the process of implementing. These ABC experiences vary from minor work involving PBES to the installation of a bridge system made completely from prefabricated elements and installed in a week or less. The following is a synthesis of the information obtained during the state training sessions:

- Most states have tried one form or another of ABC.
- Some states have institutionalized ABC programs into their practices.
- States are working to implement ABC on a more regular basis.
- In urban states, congestion is a major factor that drives the adoption of ABC.
- In rural states, detour length is an important factor in considering ABC.
- States have great interest in how to implement ABC and are very interested in other states’ experiences.
- States want to know what criteria should be used when evaluating a project for the possible use of ABC.
- States want to know the real costs and real savings of ABC.
- States are looking for successful ways to gain contractor buy-in by communicating the shared benefits of using ABC.
- States want to determine how policy changes, creation of standards, plan development, and time commitments affect the level of effort (cost) involved

in a state ABC program.

- States want advice about how to sell ABC to upper management and policy makers. They realize that the whole team needs to be on board for ABC to be successful.
- States like hearing about the “pitfalls” in past ABC projects and want to discuss how best to avoid these issues.
- Generally, states implementing ABC have had good experiences with ABC and its learning curve.
- Costs of using ABC continue to be a challenge. Bid prices for ABC bridge projects are approximately 20% higher than those for traditionally constructed bridges. However, comparisons of total costs of ABC versus traditional construction (including items such as project management, traffic control, user costs, and service life) show that ABC projects can be economically competitive. In states that have completed several ABC projects, unit bid prices have fallen to the point that some bid prices on ABC precast concrete elements are now lower than cast-in-place options.
- In all the projects reviewed in this effort, the ABC projects have a lower total cost to society than traditionally

built projects once user costs are factored in. This finding suggests that a commitment to ABC in the short run will result in cost savings for both the state DOT and the users in the long-run.

Summary

ABC is no longer a new concept and is becoming an accepted practice among state DOTs with and without SHRP2 implementation support. Lessons learned from demonstration projects and shared experiences from peer-to-peer exchanges have minimized the risks of ABC projects for the owners, designers, and contractors who execute them. Recent and ongoing state training sessions clearly explain to significant groups of agency staff members and contractors the “why and how” of ABC for bridge projects, thereby providing a better understanding at all levels of the benefits of using an ABC approach in projects.

As ABC methods and understanding mature, all parties involved in the process will become better informed about the costs and benefits of building bridges with an accelerated approach. The PBES that are presented in the ABC Toolkit are good examples of how the bridge-building

industry can reduce user delays and improve the quality and safety of bridge projects.

For more information, presentations, documents, and resources, please visit the American Association of State Highway and Transportation Officials’ SHRP2 site (<http://shrp2.transportation.org/Pages/Bridge-Designs-for-Rapid-Renewal.aspx>) and the Federal Highway Administration’s GOSHPR2 site (<https://www.fhwa.dot.gov/goshpr2>). For other inquiries, email Jamal Elkaissi of the Federal Highway Administration at: Jamal.Elkaissi@dot.gov. 

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EDITOR’S NOTE

The editors of ASPIRE® appreciate the continued efforts of FHWA and AASHTO to encourage widespread use of PBES.



Strategic Highway Research Program accelerated bridge construction training class in South Dakota. Photo: Pam Hutton, SHRP2 Implementation Manager.