

Indiana

Officials at Indiana Department of Transportation use quarterly meetings, conferences, and consultant ideas to expand techniques and improve designs

by Anne Rearick and Jeremy Hunter, Indiana Department of Transportation

Indiana is a really flat state, which mitigates some of the topographical challenges faced by other states. Even so, we continually look for ways to improve our bridge designs and make them more efficient and faster to build. Those methods include quarterly meetings with the Federal Highway Administration (FHWA) and consultants, a bridge conference, and encouragement to outside designers and contractors to examine new techniques.

The ASCE-INDOT Structures Committee was formed in the 1990s by the Indiana Department of Transportation (INDOT) and the Indiana Section of the American Society of Civil Engineers (ASCE) to address topics related to the design and construction of bridges and retaining walls. The group was formed when INDOT decided to produce a bridge-design manual and sought perspectives from other sources. That

input proved so valuable that the committee became permanent, holding quarterly meetings.

The current committee consists of 18 members: eight INDOT staff, seven design consultants (one from each firm), two industry and two academic members (with two slots currently unfilled), and a representative from FHWA. Members typically either attend or send a representative, indicating the value that they too place on these meetings.

This collaboration provides insight into bridge history that INDOT may not know, new techniques being used in the state by other owners, and work in other states with which members work. This input helps keep INDOT current and allows it to put policy changes into place to create better practices and designs. This volunteer effort by knowledgeable people provides a significant benefit to the state.

Expansion Joint Designs Improved

For instance, one of the committee's most recent focuses has been to improve joint designs, to extend their service life. Typically, INDOT gets a service life of 7 years for smaller joints and 10 years from Class SS (strip seal) expansion joints. The state looked at link-slab design options and are working with other states to find solutions that do not require proprietary designs, are easily repaired, and have extended service life.

One approach tried when upgrading or rehabilitating an existing bridge has been to change the superstructure to semi-integral spans to eliminate joints where possible. INDOT also is looking at new methods to maintain the ends of beams to prevent deterioration.

These topics and others, such as pile-driving techniques and accelerated bridge construction



The Accelerate 465 project reconstructed an 11-mile corridor of Interstate 465 and rebuilt or upgraded seven major interchanges. It included several bridges designed with precast concrete bulb-tees or U-beams. Photo: Indiana Department of Transportation.



The I-69 Twin Bridges over the Patoka River at the Pike-Gibson County Line feature an 8-in.-thick, cast-in-place concrete deck. Photo: Indiana Department of Transportation.



The I-69 Twin Bridges over the Patoka River also feature cast-in-place pier caps, columns, and drilled shafts. Photo: Indiana Department of Transportation.

(ABC) methods, are discussed annually at the bridge conference. This meeting not only gives INDOT a chance to review new techniques but allows it to encourage attendees to examine new ideas through presented case histories.

The state is very interested in doing more projects with ABC techniques of all types. Next February, INDOT will let an alternate-bid contract using either self-propelled modular transporters or slide-in construction for twin bridge replacements. The hope is that this project creates more awareness among state designers and contractors for the potential this concept offers.

Prefabricated components that can be delivered to the site and erected quickly is a key ABC method that interests INDOT. This option plays well to the state's strengths, as about 90% of bridge designs use concrete superstructures. Road crossings typically feature bulb-tee designs with mechanically stabilized earth abutments, while water crossings use spill-through end bents.

Bulb-Tees Favored

Bulb-tee prestressed concrete beams have become INDOT's basic design due to the efficiency of their spans and their availability in the state. Local precast concrete fabricators introduced the beams in 2004, and they allow span lengths up to 160 ft with a single prestressed beam.

Recent examples can be found along Interstate 465 (I-465) in Indianapolis, where a host of bulb-tee bridges were constructed due to their economy and efficiency. The design is ubiquitous around the state, as it has become one of the solutions often selected. That is especially true for longer bridges, where three-span designs are common.

Another recent project was the widening and rebuilding of the west leg of I-465 between Interstate 65 (I-65) and Interstate 70 (I-70) as part of the Accelerate 465 project. Completed in 2012, it reconstructed an 11-mile corridor of I-465 and rebuilt or upgraded seven major interchanges. The \$423-million program responded to increased traffic demands and safety requirements and featured several bridges designed with precast concrete bulb-tees or U-beams.

INDOT also uses a lot of precast concrete three-sided culvert designs. They are simple to design and have simple, quick installations. In most cases, shorter and more basic bridges are designed in-house. Timing and complexity often dictate that design should be contracted out, especially if the bridges are part of a larger, more complicated highway project.

INDOT has worked with consultants on some significant bridges in recent years. One notable



The I-69 Twin Bridges over the Patoka River at the Pike-Gibson County Line were constructed with 244 precast concrete bulb-tee girders (shown during construction under three seasons). Photo: Bernardin Lochmueller & Associates.

design was for the Interstate 69 (I-69) Twin Bridges over the Patoka River at the Pike-Gibson County Line. The 4400-ft-long bridge features concrete bulb-tee beams. The bridges were the longest on the nation's longest continuous section of new interstate highway and were constructed in an environmentally sensitive area. See *ASPIRE*™ Spring 2013 for more details about these bridges.

Preservation Work Increased

INDOT is performing more preservation and rehabilitation work as new techniques arise that can add service life. Using budgets creatively helps to maximize impact, but the state also must be careful to ensure preservation work achieves a significant benefit. Finding the proper point at which preservation offers a better option than replacement remains a key challenge.

Indiana has started using polymeric overlays for waterproofing systems on bare concrete decks as well as latex-modified bridge overlays and hydro rehabilitation techniques. The state also is focusing more attention on preventative measures to add service life. Keeping decks repaired and in good condition ensures beams

retain their strength and the bridge gains additional service life.

INDOT also is focusing greater attention on railing systems, which often serve as the most visible "face" of the bridge. Some railings are historic and architecturally significant, but they also must meet higher crash-test standards than when the originals were installed. Finding the right options takes considerable research, but it pays off by achieving all the aesthetic and functional needs.

Uncovering these new techniques and applications are greatly aided by the collaboration received from various programs. By meeting regularly and sharing ideas, INDOT hopes to create relationships and provide an environment in which ideas are shared and used to improve state bridge projects. ▲

Anne Rearick is director of bridges and Jeremy Hunter is bridge design manager at the Indiana Department of Transportation in Indianapolis, Ind.