Annual bridge projects are fairly standard, except for occasional standouts

Thinking BIG in Boone County, Iowa

by Robert Kieffer, Boone County, Iowa

Boone County typically constructs one bridge per year based on needs developed from our master map, which breaks down structures by posted weights, number of lanes, traffic flow, and other factors. Our key challenge is that, as a rural county, we have a variety of roads that aren't paved, which are used by farmers with heavy equipment. We also have the Des Moines River running through the county, which requires more complex bridge designs compared to a structure over a creek or stream.

Most of the projects that we build consist of reinforced concrete slabs or precast, prestressed concrete beams with a cast-in-place concrete deck. We're in a pretty good area for doing those types of designs, with a number of bridge contractors and high-quality precasters within a 100-mile distance of our county. Concrete is an excellent material to work with, because it requires virtually no maintenance over the years.

We typically use standard Iowa Department of Transportation bridge designs. We are pleased that the designs are being updated to provide more flexibility and reflect concrete's versatility. For instance, concrete slab beams previously could be extended up to span lengths of 125 ft, but that has been now lengthened to 150 ft. Designs used to be divided into 12.5-ft-span length increments, but now they are provided in 10-ft increments. The changes provide more options and help us create greater span lengths.

The changes are particularly significant for bridges over water, because the slab bridges require less clearance than concrete beam bridges. Raising a slab bridge so it is above the design high-water elevation requires less earth work and material costs, which creates savings—and savings are critical when funding is restricted.

Occasionally we have special projects such as a 700-ft-long, five-span precast, prestressed concrete beam bridge across the Des Moines River. This structure was constructed with beams ranging in span length from 130 to 140 ft that were specially designed for the project.

These unusual projects teach us a great deal about using materials to their fullest. That, in turn, helps us to design the more standard bridges that we deal with every year.

Robert Kieffer is County Engineer, Boone County, Iowa.

The Mackey Bridge in Boone, Iowa, was designed with precast concrete components as a feasibility project to determine how construction could be accelerated. Photos: Iowa DOT.

Accelerated Bridge Construction

Not all of the county's bridges utilize standard designs. In 2006, the county worked with the Bridge Engineering Center at Iowa State University in nearby Ames and the Iowa Department of Transportation to determine the feasibility of using precast concrete components to accelerate bridge construction. Through the Federal Highway Administration Innovative Bridge Research and Construction Program, 120th Street Bridge over Squaw Creek was constructed using several different precast, high-performance concrete elements. The result was a 152-ft-long, three-span bridge featuring precast concrete abutment footings, precast pier caps, and precast full-depth transversely pretensioned and longitudinally post-tensioned, 8-in.-thick deck panels. Standard 32-in.-deep precast, prestressed concrete I-beams were used, with four (rather than the standard five) beams per span. The Mackey Bridge won the award as Best Owner-Designed Bridge in the Precast/Prestressed Concrete Institute's Design Awards Competition for 2007.

Information learned from the project about designing completely with precast concrete elements will benefit future projects especially in the areas of scheduling and staging. We believe that another such design would move even faster due to the steep learning curve we experienced.

EDITOR'S NOTE

If your county has a high percentage of concrete bridges or some interesting and innovative concrete bridges and would like to be featured in ASPIRE,™ please let us know at info@aspirebridge.org.

National Ready Mixed Concrete Association

The National Ready Mixed Concrete Association is sponsoring the Third Annual *Concrete Technology Forum: Focus on Sustainable Development*. The symposium will bring researchers and practitioners together to discuss the latest advances, technical knowledge, continuing research, tools, and solutions for concrete and sustainable development.

Over 50 technical sessions on state-of-the-art developments, new construction techniques, and product formulations that optimize environmental performance of concrete construction will be presented including:

- Pervious Concrete Systems;
- Concrete's Impact on Urban Heat Islands;
- The Carbon Footprint of Concrete;
- Sustainable Development Initiatives; and
- Optimizing Recycled Content.

A product expo featuring companies that offer products and services for sustainable development will be open during the conference. Attendees will earn valuable professional development hours (PDHs) and will receive a copy of the conference proceedings.

NRMCA, based in Silver Spring, Md., represents the producers of ready mixed concrete and the companies that provide materials, equipment, and support to the industry. It conducts education, training, promotion, research, engineering, safety, environmental, technological, lobbying, and regulatory programs.

National Ready Mixed Concrete Association, 900 Spring Street, Silver Spring, MD 20910, 888-84NRMCA (846-7622), www.nrmca.org.