

Iowa River bridge innovation

Building a four-lane highway bridge on U.S. 20 over the Iowa River in an environmentally sensitive greenbelt area posed challenges that took 30 years to resolve. This is a place where migrating bald eagles roost, endangered mussels live and wildflowers grow. The river valley, prized for its pristine beauty, is now the site of a world-record setting launched, I-girder highway bridge.

Launching the girders reduced the need to place cranes and equipment in the riverbed, thus avoiding most of the disruption to flora and fauna that normally accompanies bridge construction. This structural innovation not only preserved the greenbelt, but also set new world records for the longest spans (302 feet or 92 meters) of a launched steel girder bridge and longest free cantilever.

Ordinarily, continuous welded plate girder bridges are designed for loading conditions after erection. The usual structural design includes loading during the deck construction, and during service after a deck overlay. Designers don't usually consider stresses exerted during the fabrication and erection processes.

In addition to its other merits, the project provided a unique opportunity to conduct research on unusual structural behavior during the erection process. The steel girders and diaphragm were constructed in a launching pit behind the future abutment location and the frame was rolled out over the river valley one span at a time.

Because the bridge girders were launched into place instead of being picked up and placed by crane, there were



The cantilever support condition during the third launch from Pier 4 to Pier 3

unusually large and varying stresses in the girders as they were pushed out over the river valley. The weight of the leading span girders caused large stresses in the girder flanges and webs at the cantilever support rollers. Girder elevation irregularities at cross frames caused uneven stresses from girder to girder at a line of support rollers. Also, continually changing deflected shapes of the girders sometimes caused them to lift off a line of support rollers. During the sequence of launches, portions of the girders went through several cycles of loading, including reversal of bending stress.

To monitor structural behavior during the launch process, researchers applied strain gauges at several girder cross sections and measured strains. The test results will be part of a reference manual created for the project. The manual also will include field data for cross frame behavior, axial load in the girders during launch, forces in pier caps, and pier column behavior.

Several national publications have highlighted this award-winning bridge. The designer, HNTB Corporation, has received considerable interest in the launching technique and anticipates using the technique in suitable future bridge projects.

Because of the national interest in the project, the Iowa Department of Transportation's Office of Bridges and Structures, Federal Highway

Administration, and contributing partners — HNTB Corporation, Jensen Construction, and the Center for Transportation Research and Education at Iowa State University — plan to document the launching technique, including a professional video with a reference manual for distribution to the engineering community in 2004.

Iowa River bridge, continued back side

Director's Corner

"Together, everyone achieves more." We in Iowa are putting this little slogan into action, with exciting prospects.

The Iowa DOT, the three state universities, and the Center for Transportation Research and Engineering recently signed a Collaboration Agreement for Iowa Transportation Research. Each party has resources and expertise engaged in areas of transportation research. Since resources and funding are limited, we can all benefit from cooperation.

Each of us will have the opportunity to learn more about the research programs of the others. Focus groups will be used to identify research needs in aspects of transportation such as traffic and safety, geotechnical, maintenance, pavements, hydraulics and drainage, roadside vegetation, structures, planning, environment, economics and finance, and transportation modes. The steering group will discuss the needs that have been identified along with possible sources of funding and expertise.

By collaborating we can create synergy that will advance transportation research in Iowa far beyond what any of us can achieve individually. Exciting, indeed.

Sandra Larson, Director
Research and Technology Bureau





Travel Info

It keeps getting better

Iowans have already begun dialing 511 and checking the Web at 511ia.org and www.iowaroadconditions.com for winter road conditions. And they're discovering a few enhancements have been made to the system.

One new category of information is incidents. An "incident" is any situation that results in a temporary road closure or an unusual traffic delay. Another addition for winter is a "no tow" advisory, alerting the public when tow trucks will not be permitted to operate on interstate highways due to weather conditions or snow removal operations.

Keeping motorists informed about road conditions is a collaborative effort between the Iowa DOT and Iowa State Patrol. The 511 Web site is supported by CARS (Condition Acquisition and Reporting System) software. The site can be used to view National Weather Service forecasts and alerts across the state, and the Iowa winter road conditions map. The map shows where road conditions are normal, wet, partially covered, mostly covered, or completely covered, and where travel is not advised or the road is closed.

Non-winter information offered on the 511 site includes road or bridge closures, construction projects with detours, locations with vehicle restrictions (weight or width), and maintenance activities resulting in traffic delays of five minutes or more.

The 511 and Iowa Road Conditions Web sites have been very popular with a high volume of "hits." The 511 phone line received over 200,000 calls from January through August 2003. As more users become aware of the services offered, even greater use of the Web sites and the phone line is anticipated.

For more information, contact Mike Jackson, Bureau of Research and Technology at 515-239-1192 Michael.Jackson@dot.state.ia.us

Symposium

We're proud to say the 2003 Mid-Continent Transportation Research Symposium was a great success! More than 300 people attended the conference. Participants were able to choose from 27 concurrent sessions on a range of interesting topics. Guest speakers were Dennis Judycki of Federal Highway Administration (FHWA), John Horsley of American Association of State Highway and Transportation Officials, and Dean Carlson, retired from FHWA and Kansas DOT.

Plans are now underway for the next symposium, to be held Aug. 18-19, 2005. Mark your calendars!

WWW

Check the Web!

Transportation Research Web Sites

Library users no longer need to visit a physical library to take advantage of library resources. Through the Internet we can visit most libraries and search their catalogs. Interlibrary loans then allow us to borrow what we need. Here are three Web sites for libraries with large reference sections and transportation resource information.

Northwestern University has one of the largest transportation libraries in the world, with information on all transportation modes, including air, rail, highway, pipeline, water, urban transport and logistics. Its collection of environmental impact statements is one of the most complete in the world.
<http://www.library.northwestern.edu/transportation/>

The University of California at Berkeley Institute for Transportation Studies has a listing of online reference sources and Web resources. The collection is particularly strong in the fields of air transportation, highways, intelligent transportation systems, urban transportation, and traffic engineering.
<http://www.lib.berkeley.edu/ITS/ITSL/refbyal.html>

Another good site is Texas Transportation Institute. TTI works closely with many state and federal agencies, as well as the private sector, to improve the safety and efficiency of the transportation system.
<http://tti.tamu.edu/research/research>

If you know of a great Web site that should be included in a future newsletter, please let us know. Contact Carol.Culver@dot.state.ia.us.

Iowa River bridge, continued from front side

The video will be of general interest, possibly even suitable for public television broadcast. The reference manual will provide technical information for other transportation agencies considering similar launched steel bridge projects.

For more information, contact Norm McDonald at 515-239-1206. E-mail Norman.Mcdonald@dot.state.ia.us.

IOWA DEPARTMENT OF TRANSPORTATION RESEARCHnews

The Bureau of Research and Technology enhances Iowa DOT's ability to deliver efficient and effective transportation services by actively promoting research partnerships, knowledge and technology transfer, Intelligent Transportation Systems and information technology.

For more information, see www.dot.state.ia.us/research/index.html or call Carol Culver at 515-239-1208.

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