

Minnesota Department of Transportation researchers are trying to work out the kinks in a bridge-building technique that promises to speed up construction of short-span bridge types common in rural areas.

The “precast composite slab span system,” based on a French design and used by MnDOT to build a dozen bridges since 2005, aims to shorten construction time and reduce delays for the traveling public.

The problem: Surface cracks have appeared those bridge decks, more so than in conventional bridges.

MnDOT’s precast method is an example of accelerated bridge construction, which is on the rise as transportation departments aspire to shorten the amount of time a bridge is closed to traffic.

Not everyone is on board with the trend. Another school of thought says it may be better to take a bit more time up front and make sure the work is done correctly and economically.

“I understand that all agencies are trying to minimize traffic disruptions, but at what cost?” said Matt Zeller, executive director of the Concrete Paving Association of Minnesota and a former MnDOT assistant concrete engineer.

Paul Rowekamp, a MnDOT bridge standards and research engineer, said the agency is enhancing concrete mixes as part of an effort to reduce cracking in the precast bridge decks.

The surface deck cracking doesn’t compromise the structural integrity of the bridges, but it results in higher maintenance costs over the life of the structures, according to Rowekamp.

“It’s all about long-term durability, which is important for our local partners,” Rowekamp said. “They want to build it once and not go back for a long, long time. We are not quite there yet.”

Zeller said it “seems like a good idea to minimize disruptions. But if they are looking at short spans, which would generally imply they would be in more rural locations, I’d think the amount of traffic disruptions would be minimal.”

Years ago, no one thought much about “user costs” such as traffic delays, according to

Rowekamp. But as traffic volumes increase, more agencies are looking at ways to pick up the pace of construction, he said.

Last year, for example, MnDOT used a “self-propelled modular transporter” to expedite construction of the \$14.1 million Maryland Avenue Bridge over I-35E. The method reduced by about 60 days the time the bridge had to be closed, according to MnDOT.

As previously reported by Finance & Commerce, the bridge was built off to the side and moved into place with the transporter, a mammoth piece of equipment capable of hauling up to 15,000 tons.

But those big machines come with a price.

Use of the modular transporter added about \$1 million to the cost of the Maryland Avenue bridge project, MnDOT officials said at the time. Zeller said the extra \$1 million spent on the Maryland Avenue, for example, could have paid for “a couple of miles of roadway.”

Rowekamp said the accelerated precast bridge projects cost about 10 percent to 15 percent more than conventional bridges, not including the cost of fixing the cracks.

The precast system features factory-built precast forms delivered to the construction site. One way it saves time: crews don't have to build temporary forms and wait for concrete to cure on site, Rowekamp said.

Between 2005 and 2011, MnDOT put up 12 of those bridges on highways from Lake City to the Root River area. Researchers from the University of Minnesota's Center for Transportation Studies assessed the bridges' performance in a recent report.

The report found that performance improved with incremental advances in the design. But bridges built with the most advanced designs still had “significant issues with cracking,” it said.

Rowekamp said a polymer-type overlay can be applied to the surface to deal with cracking issues. However, those overlays add to the project's cost, and they last only about 25 years

on bridges designed to last 75 years, he said.

The goal is to keep the cost as close as possible to that of a conventional bridge, he said.

“We know things we can do that will whip the problem,” he said. “But they come at a cost.”

One of the 12 precast bridges is the Highway 8 bridge over Center Lake Channel near Center City.

Joe Triplett, Chisago County’s county engineer and public works director, said that the bridge “seems to be working fine,” and that he hasn’t heard any negative comments about its quality.

The bridge was built in 2005. Construction was swift, which is fortunate because the bridge has lakes on both sides and there’s not a good detour route, Triplett said. Access is important, he said, because a government center, court house and other services are just east of the bridge.

“We certainly don’t see ill effects,” Triplett said. “And any time MnDOT can do something faster and more efficient — from the local end of it we certainly appreciate it.”

#### Precast bridges

The Minnesota Department of Transportation used an accelerated construction technique featuring a precast deck system to build 12 bridges throughout the state from 2005 to 2012.

The system speeds up construction, but MnDOT officials are still seeing premature cracking in the deck systems in those bridges. The department is tweaking the concrete mixtures in an effort to fix the problem.

The bridges are at:

Highway 72 over the Tamarac River in Waskish;

Highway 8 over Center Lake Channel near Center City;

Highway 76 over the south fork of the Root River;

Highway 65 over Groundhouse River near Mora;

Highway 65 over Ann River near Mora;

Highway 60 over Cannon River near Faribault;

Highway 248 over Swan River near Little Falls;

Highway 238 over Pike Creek near Little Falls;

Highway 4 over Little Cottonwood River in Sleepy Eye;

Highway 28 over the Swan River near Swanville;

Highway 61 over Gilbert Creek near Lake City;

Highway 29 over Outlet Creek near Starbuck.

Source: [finance-commerce.com](https://www.finance-commerce.com)