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Sensors keep bridge data flowing

Fiber optic threads monitor bridges for soil erosion, damage

The highway bridge over Salt Creek in Elmhurst is arguably the safest water crossing in Illinois. It should be, because it has been monitored for trouble more than any other bridge in the state.

The span, near the intersection of Illinois Highway 83 and St. Charles Road, faces no sudden danger of falling down, according to the Illinois Department of Transportation. But on a 1-to-8 scale assessing the risk of the bridge foundation failing under certain



Jon Hilkevitch
Getting Around

circumstances, the Salt Creek bridge was rated a 3 by IDOT, where 1 is the worst.

Rising and falling water levels stir up the bridge's creek-bed foundation and cause soil erosion at times of flooding and seasonal changes.

IDOT officials conferred with researchers from the University of Illinois at Chicago, who are paying attention to the area where the bridge piers are secured underwater. It is the focus of an experimental project to remotely monitor the safety and "structural health" of bridges around the clock, like constantly checking a hospital patient's vital signs.

Bridge safety experts say the UIC project represents an extra safety net needed to keep tabs on the increasing inventory of deficient and functionally obsolete infrastructure in the U.S.

The project is under way three years after the nation received a shocking wake-up call about the poor condition of U.S. bridges when the Interstate Highway 35W Bridge over the Mississippi River in Minneapolis collapsed Aug. 1, 2007. Thirteen people died and more than 145 were injured when the bridge crumbled beneath their vehicles.

Being able to electronically monitor bridges 24 hours a day would represent a safety breakthrough, according to structural engineering experts. With no hint of what was to occur, the I-35W bridge was visually inspected shortly before the disaster.

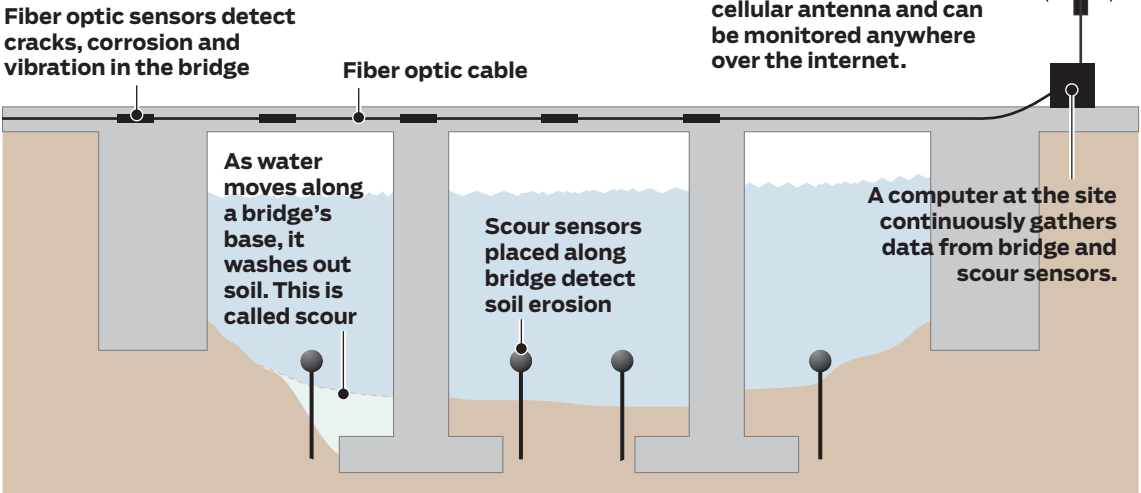
At the Salt Creek bridge, 14 fiber optic sensors — consisting



UIC Engineering professor Farhad Ansari, left, and engineering student Chad Fischer wade through Salt Creek to check on monitors under a bridge along Illinois Highway 83. CHRIS WALKER/TRIBUNE PHOTO

New technology offers a continuous inspection of bridges

Researchers at the University of Illinois at Chicago hope technology they have developed — which uses rugged fiber optic cables, bridge sensors and the Internet — will allow agencies to keep constant tabs on the condition and safety of any outfitted bridge.



SOURCE: Farhad Ansari, University of Illinois at Chicago

Bridge scour compromises the integrity of a structure by removing sand and rocks from around bridge abutments or piers and scooping out scour holes. It is the most common cause of bridge failures in the United States, mostly affecting single-span bridges with vertical wall abutments, like the Salt Creek bridge, officials said.

The bridge is the only structure in Illinois outfitted with the sensors monitoring scour depth. Other types of sensors can detect cracks, corrosion and other potentially catastrophic flaws.

Ansari has installed similar monitoring systems on the Brooklyn Bridge in New York because of major cracks found in the suspension bridge's vault system, and on the Sheng Li Bridge, a cable-supported span over the Yellow River in China.

His goal is to reduce the cost of such monitoring devices, which now cost about \$140,000 for a system covering a four-span bridge, and to work with companies to make a commercial version of the research tool.

Many bridges in Illinois, including those over the Mississippi and the historic drawbridges spanning the Chicago River downtown, also merit extra scrutiny because of their age, the large number of vehicles crossing each day and outmoded designs that lacked redundancies to prevent a failure in one section of a bridge from leading to a collapse, Ansari said.

IDOT officials are evaluating the Salt Creek experiment before deciding whether to proceed with remote monitoring of more bridges.

The Illinois State Toll Highway Authority is paying close attention to Ansari's work. Paul Kovacs, the toll authority's chief engineer, and other tollway staffers met with Ansari last week to discuss a monitoring project focusing on some bridges along the 286-mile toll road system.

The tollway officials showed particular interest in crack and scour sensors, Ansari said. Tollway officials, however, declined to identify specific bridges that would be candidates for remote monitoring.

"Bridges pose some real opportunities for us to have ongoing monitoring so we can be fully confident they are structurally sound," said Kristi Lafleur, the tollway's executive director. "That is a powerful tool for us. No human being would ever be able to do that."

Contact Getting Around at jhilkevitch@tribune.com or c/o the Chicago Tribune, 435 N. Michigan Ave., Chicago, IL 60611. Read recent columns at chicago.tribune.com/gettingaround.

Wiccan minister says pagans are a big-tent group

Paul Larson doesn't celebrate Halloween. Instead, he spends Oct. 31 in a worship service that's a ritual feast with offerings of sweet cakes and ale to the ancestors.

For many pagans such as Larson, Oct. 31 is the autumnal new year called Samhain, a time when the veil between the spiritual world and the world as we know it is the thinnest and it's possible to contact those who have passed away.

"We honor the ancestors by casting a magical circle of protection and invoking the divine powers in the form of a god and goddess," said Larson, a white-haired 63-year-old with a professorial air. "And there's chanting to create and

build energy within the group, and sometimes a bonfire."

A member of the Wiccan branch of paganism, Larson knows that some people equate his religion with evil witchcraft and devil worship and that evokes a wide range of images and controversies — from people wearing conical hats, black gowns and medallions to the recent dust-up over GOP U.S. Senate candidate Christine O'Donnell, who has taken flak for saying she "dabbled into witchcraft." But Wiccans don't like that she linked their religion to Satanism.

Larson said the reality is that paganism has nothing to do with Satan worship and that the pagan tent is large enough to include people who do identify as witches (although not the green-faced, wart-laden stereotypes) and people like Larson, a Chicago attorney who has a doctorate in psychology and who's on the faculty of the Chicago School of Professional Psychology.

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He said he spent years searching religions for the proper spiritual fit. "I was born into the Mormon faith, converted to the (Episcopal) faith and then became a Buddhist," Larson said. "But I had been investigating paganism since 1969."

About eight years ago, after experiencing the loss of several family members and friends, he began to concentrate on paganism.

"I still consider myself a hyphenated American, a Mormo-Episco-Buddhi-pagan," said Larson, who has a Buddhist statue in his office located in the Merchandise Mart. The statue isn't too far from the certificate that shows he was ordained over the summer as a Wiccan minister.

"Eight years ago as I was going through my (reinvention), I stopped believing in religious exclusivity, that there was one path through which the divine speaks," he said.

Larson said that despite the misconceptions, contemporary paganism has become attractive to more people, particularly young people, over the last three decades because of its reverence for the environment and its embrace of feminism. It also allows for a diversity of thought and belief systems that aren't bound by a singular doctrine.

"There's no formal book or scripture that's considered divinely revealed," Larson said. "Pagans don't have to reconcile a creation story written millennia ago with the findings of modern science. Consequently, most pagans are quite comfortable with a scientific world view including such

specific ideas as evolution."

And pagans don't proselytize. It's not clear how many Americans identify as pagans because many fear their acknowledgement would lead to discrimination. (As Larson puts it, "It's hard to come out of the broom closet.")

But a 2008 American Religious Identification Survey out of Trinity College in Connecticut suggests that practitioners may be more comfortable identifying as pagans. According to the survey, those calling themselves pagans increased from 140,000 to 340,000 between 2001 and 2008. The number of Wiccans grew from 134,000 in 2001 and 342,000 in 2008.

Larson said the increase in part is because the religion has become more acceptable in the mainstream.

Three years ago, Larson's church, the Wisconsin-based Circle Sanctuary, was a plaintiff in a decade-long lawsuit that got the U.S. Department of Veterans Affairs to add the Wiccan pentacle, or five-point star, to the list of religious emblems allowed on veterans' graves. The government settled the lawsuit.

"Just as Christians have the cross and Jews have the Star of David, we wanted to allow fallen pagan soldiers the same dignity of having the pentacle placed on their government-paid-for tombstones," Larson said.

After years of protests and advocacy work, Circle Sanctuary and others were successful in getting colleges (including Northern Illinois University), hospitals and prisons to open their chaplaincies to pagan ministers. Larson ministers to inmates at Chicago's Metropolitan Correction Center and a prison in Wisconsin.

"As pagans, they feel isolated from other inmates who don't share their background," Larson said. "I've had several inmates tell me that I've been the only one who has visited them."



"It's hard to come out of the broom closet," but it's getting easier, says Paul Larson, a Chicago attorney and Wiccan minister. WILLIAM DESHAZER/TRIBUNE PHOTO

As a professor, Larson teaches hypnosis, and he interacts with students who typically come to psychology with a fairly secular point of view. He said many of his students don't care about his religious beliefs. Consequently, he's been able to maintain good relationships with students of different faiths.

He said he's begun meeting more young people born into paganism, and that would have been unheard of in his generation.

"More people see the importance of reconnecting with nature as technology pushes us further away from it," Larson said. "A lot of us feel, whether we're pagan or not, that we've lost touch with the natural processes of the world and we need to reconnect with cycles of the seasons."

dtrice@tribune.com