

## Bridge Design & Engineering

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■ ■ ■ ■ winter maintenance

Ten US states are intending to install test sites this summer

### SAFETY IS NO ACCIDENT

Accident statistics from last year's winter season show a dramatic improvement in safety at Safelane installation sites in the USA. Bob Persichetti reports

Something unheard-of happened at nine accident-prone road and bridge sites in the United States last winter. No weather-related accidents. There were no weather-related slide-offs on the eastbound Interstate 80, the Ohio Turnpike, at exit 173 near Brecksville which had previously seen 49 accidents in just two years. Neither were there any weather-related accidents on the Blatnick Bridge slip road near Superior, Wisconsin, which had logged twenty crashes over four years. The westbound lanes of the McLean Bridge in McLean, Texas, saw no accidents, despite a three-day ice storm in December which caused problems up and down the interstate, and an accident on the adjacent eastbound bridge lanes.

Motorists may have thanked their lucky stars, but credit should instead go to the new overlay technology common to all these sites. Safelane surface overlay is generating interest from highway safety authorities internationally including Canada, Great Britain, Russia and Japan. At the same time, a growing number of transportation departments around the United States are installing it on test sites. "This is potentially the biggest technological breakthrough for improving highway safety in snow-belt regions since the invention of the snowplough," says John Bray of the Minnesota Department of Transportation, which is one of ten states intending to install a test site this summer.

Safelane is made up of a patented combination of epoxy and aggregate rock, and the overlay is installed in summer. Transportation departments then 'charge' the surface with their standard liquid de-icing chemicals before frost or ice storms are expected. The Safelane material acts like a rigid sponge, storing the chemicals inside, and then automatically releasing them as conditions develop for the formation of ice or snow. It continues to release the anti-icing chemicals over multiple events.

It sounds simple enough that its inventor, Russ Alger, director of the Institute for Snow Research at Michigan Tech University has grown used to hearing, "Why didn't anyone think of this sooner?" In fact, it took Alger years of research to come up with the right aggregate and the right product combinations to produce the kind of consistent results transportation departments demand.

In 2003, the technology was licensed to Cargill and has met with an enthusiastic

response. In a little more than two years, more than two dozen projects are completed or are scheduled for completion before the winter of 2006-2007. An analysis of Safelane Surface Overlay's performance during the 2005-06 winter season, conducted by a snow and ice control authority, concluded that it is providing safety and mobility benefits while requiring significantly less chemical treatment during winter storms.

The report, commissioned by Cargill and conducted by Asset Insight Technologies, a consulting service for the winter highway maintenance industry, summarises its performance at all nine test installations in place during the winter of 2005-2006 across six states, as far north as Wisconsin and as far south as Texas.

"For statistically significant results, safety studies need to be conducted over a number of years," says Wilfred Nixon, president of Asset Insight Technologies, professor of engineering at the University of Iowa. "But while these data are preliminary, it appears that the improved performance of the Safelane overlay does indeed translate into safety improvements for the travelling public." In fact, the report notes, there were no weather-related accidents at the nine installations sites over the winter season; a very small number of slide-off incidents in Ohio were attributed to excessive speed. In many cases this contrasted with accidents on nearby untreated stretches, and in nearly all cases the treated sites had a history of winter weather accidents.

"The goal in South Bend was to improve safety and reduce accidents on the Ironwood Bridge. We met that goal this past winter and we're thrilled with the results," says Tom Koniczny, Indiana DOT engineer. "Based on the results, we'd like to try this system on other bridges in our district."

Nixon presented details of his report during a May internet seminar 'attended' by more than 160 people from around the world. In nearly all cases, said Nixon, test sections remained clear of snow or ice at times when it was accumulating on untreated (control) sections of roads and bridges. When accumulation did occur in heavy snowstorms, the snow and ice did not bond to the surface, resulting in easier ploughing.

Bare pavement could be maintained on test sections with about half the chemical applied to the control sections, and there were no concerns with chemical slickness or

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slipperiness even when chemical was applied in conditions where it could be expected.

Highway safety authorities spent more than an hour quizzing Nixon on issues including how Safelane stands up to mechanical abrasion from snowploughs or heavy traffic volume. Nixon called on participants to offer insights including local highway official Ron Cole, who has three years experience with Safelane on a bridge near Crandon, Wisconsin. Cole noted, "You can't find any wear on the bridge. No chipping. Looks fine." Steve Giese, Indiana DOT concurred: "I don't feel like snowploughs tamper with the surface one bit. We didn't even get a shovel full of stone off the whole bridge during the whole winter. As for the traction, we love the traction control that it gave us."

Another participant asked about the skid resistance and wear performance of Safelane. The Virginia Transportation Research Council's Michael Sprinkel, a national expert in the design, construction and evaluation of epoxy overlays replied, "We have no indication that we should expect any difference in skid performance between Safelane and standard epoxy overlays. So, if Safelane performs as well as the standard epoxy overlay, you can expect to have good skid numbers for 15-25 years or more."

Nixon's report includes a number of anecdotes from highway safety officials. "The bridge westbound (control section) was slushy and a little slippery," notes an Indiana highway department report on the Ironwood Bridge at South Bend on December 1, 2005. "The new bridge eastbound (test section) was just wet. Nothing stuck. We anticipated Tuesday (two days prior to the event). The bridge worked this time."

Like the Ironwood Bridge, a primary concern for Minnesota and Wisconsin DOT officials was the number of accidents on the Blatnik Bridge linking the cities of Superior, Wisconsin and Duluth, Minnesota. MNDOT's Jeffrey Hall summarises the experience at that site by saying, "The area where Safelane was applied holds the chemical longer and when it snows, it seems to have more traction than the surrounding area."

Safelane's first test site was installed in 2003 on the accident-prone Wolf River Bridge in Wisconsin. Ron Cole, of the Forest County Highway Department, logged 32 entries over 2005/6. The February 4, 2006 entry is illustrative. Cole notes the bridge had last been treated with anti-icing chemicals 18 days ago on January 16, and writes, "Road froze over about 5pm on both sides of the bridge. Bridge still had traction. Cars in ditch going up hill to the east." Despite the bleakest of conditions, freezing rain, rain mixed with snow and a 270mm pile-up of wet snow, Cole's report repeatedly summarises bridge conditions in two words: "No problem."

Cole and other highway officials also like the fact that they can apply anti-icing chemicals to their own schedule. "The bridge will most likely take care of itself during the early states of a snow/ice event. This will improve efficiency of maintenance operations," predicts Bray, talking about the recent Safelane installation on the Mitchell Bridge near Hibbing. It is the first test site in the state of Minnesota, and a location that



Safelane is a patented combination of epoxy and aggregate rock, which can be installed in the summer

saw 14 weather-related accidents in the last four years.

Adverse weather conditions contribute to an average of 1.4 million car accidents in the United States alone each year. This results in 7000 deaths, more than 600,000 injuries, and US\$42 billion in economic loss, according to the National Oceanic & Atmospheric Administration ■

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