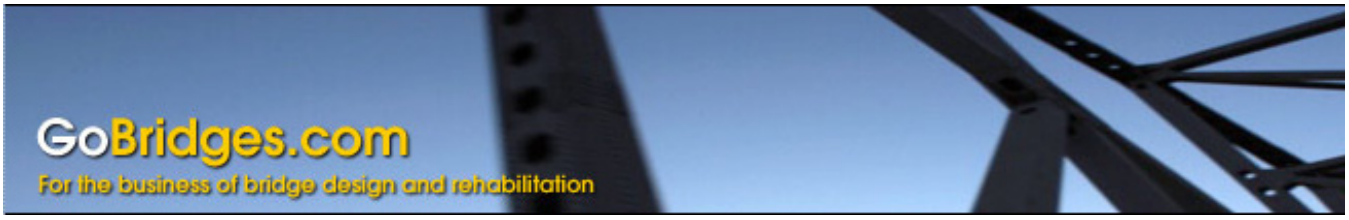
SafeLane™
Surface Overlay

Protecting people, bridges and roads™



Safe in the snow

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December 15, 2006
Bob Persichetti

Epoxy-aggregate overlay 'stores' anti-icing chemicals to keep bridge decks frost free.

This may be the winter the phone stops ringing in the middle of the night for the highway crews charged with keeping the Highway 169 Mitchell Bridge near Hibbing, Minn., safe for motorists. This summer, the bridge became part of an elite group of 16 test sites for a new technology in more than a dozen states. If that technology, SafeLane Surface Overlay, works as well in Hibbing as it has at other spots, it will mean fewer crashes and better mobility for drivers, as well as a better night's rest for some of the highway maintenance workers upon whom the traveling public depends.

This winter marks the fourth year in which SafeLane is helping to keep the Wolf River Bridge on Route 8 near Crandon, Wis., ice and frost free. "We had no calls, no complaints, and most importantly, no accidents," said Ron Cole of the Forest County Highway Department.

SafeLane comprises a patented combination of epoxy and aggregate. The overlay is installed in summer or fall. Transportation departments then "charge" the surface with their standard liquid anti-icing chemicals before frost or ice storms are expected. The SafeLane material acts like a rigid sponge, storing the chemicals and automatically releasing them as conditions develop for the formation of ice or snow. The result is safer roads with better mobility and less maintenance because the overlay helps prevent frost or ice from forming on road or bridge surfaces. In addition, SafeLane keeps releasing the anti-icing chemicals over multiple weather events.

It sounds simple enough, but it took SafeLane inventor Russ Alger, director of the Institute for Snow Research at Michigan Tech University (MTU), years of research to come up with the right aggregate and product combinations to produce the consistent results transportation departments demand. The technology was licensed to Cargill in 2003, and in less than three years, more than two dozen projects are completed or are scheduled for completion before the winter of 2006-2007. The Federal Highway Administration, as part of its Innovative Bridge Research and Construction program, recently awarded more than $550,000 to four states (Idaho, North Carolina, Pennsylvania, and Texas) to help finance SafeLane installations.

Noticeable safety improvements

An analysis of SafeLane Surface Overlay's performance during the 2005-2006 winter season, conducted by a leading snow and ice control authority, concluded 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, summarized SafeLane's 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

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Safe in the snow (continued)

conducted over a number of years," said Wilfred Nixon, president of Asset Insight Technologies, professor of engineering at the University of Iowa, and a snow- and ice-control expert. "But while these data are preliminary, it appears that the improved performance of the SafeLane overlay does indeed translate into safety improvements for the traveling public."

In fact, the report noted, there were no weather-related accidents at the nine installation sites during the winter season (a very small number of slide-off incidents in Ohio were attributed to excessive speed). No weather-related slide-offs occurred on eastbound Interstate 80, the Ohio Turnpike, at exit 173 near Brecksville, where 49 accidents occurred previously over two years. No weather-related accidents occurred on the Blatnick Bridge on-ramp near Superior, Wis., which had logged 20 crashes over four years. No accidents occurred on the westbound lanes of the McLean Bridge in McLean, Texas, despite accidents "up and down the interstate" during a three-day ice storm in December, and an accident on the adjacent eastbound bridge lanes.

Nixon presented the following conclusions during a May webinar attended by more than 160 people from the United States, Canada, Europe, Russia, and Asia:

- in nearly all cases, 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 plowing;
- bare pavement could be maintained on test sections with about half the chemical applied to the untreated (control) sections; and
- there were no concerns with chemical slickness or slipperiness, even when chemical was applied in conditions where such slickness could be expected.

After the presentation, highway safety authorities quizzed Nixon about how SafeLane stands up to mechanical abrasion such as snowplows or heavy traffic volume. In response, Forest County, Wis., highway official Cole said, "You can't find any wear on the bridge. No chipping." Steve Giese, Indiana DOT concurred, "I don't feel like snowplows tamper with the surface one bit. We didn't even get probably a shovel full of stone off the whole bridge during the whole winter."

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 Cargill's SafeLane performs as well as the standard epoxy overlay, you can expect to have good skid numbers for 15 to 25 years or more."

Highway officials can better manage crew overtime with SafeLane because they can apply anti-icing chemicals on their schedule, rather than during a call-out in the middle of the night. It's a reversal of the traditional pattern of ice or frost build-up first, followed by highway crew response. "The bridge will most likely take care of itself during the early states of a snow/ice event," said John Bray, MnDOT District 1. "This will improve efficiency of maintenance operations."

A textbook installation

The July 2006 installation on the Mitchell Bridge near Hibbing, Minn., is the first test site in that state. The Mitchell Bridge had become so notorious for accidents that in 1995 MnDOT installed an automated spray system for deicing it. The system included dial-in technology that was supposed to allow MnDOT to call-in instructions for the automatic spraying of anti-icing chemicals as weather conditions dictated. But according to Duane Hill, MnDOT assistant district engineer for Maintenance Operations, "It never really worked." MnDOT eventually removed the system after years of struggling with high maintenance and poor reliability.

Then in 2005, transportation officials in Wisconsin installed SafeLane on the Blatnik Bridge between Superior, Wis., and Duluth, Minn. The Blatnik Bridge also has a long history of accidents. Anecdotal reports reached MnDOT that on snowy days maintenance crews arriving at the Blatnik test site found the SafeLane surface wet, rather than snow compacted. "That install really caught the attention of our district engineer, who places a strong emphasis on safety," said Hill. "He pushed those of us in District 1 to develop a research project for Minnesota."

The Mitchell Bridge topped the list of prospective test sites in the district because of its high rate of weather-related accidents. The test site is actually two bridges over railroad tracks connected by a roadway. In all, SafeLane was to be applied to 16,000 square feet of bridge deck and roadway. MnDOT decided to use its own crews to install the overlay. Anthony

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Safe in the snow (continued)

Hensley, who provides assistance on SafeLane installations for Cargill, began working with MnDOT several weeks before the project's scheduled start date. Hensley offered insights from previous installations, such as how to distribute the aggregate, how large of a work crew would be needed, and job sequencing. Video clips and photos of past installations supplemented the meetings to help MnDOT managers envision how the project would look.

SafeLane is applied in a decidedly low-tech, traditional manner. Crews must hand spread the sticky, black epoxy across the road surface. The initial coat is applied at a thin rate. After the epoxy is hand-spread on the surface, the aggregate is immediately shoveled across the surface. Next, a sweeper truck passes by to take out loose aggregate, followed by two leaf blowers to remove any excess stone.

With daytime temperatures in the 80s, the overlay was left to harden for about an hour, then a second coat was applied following the same protocol, but at a thicker rate. The final profile is about 3/8 inch thick. Installation followed the recommended method outlined in AASHTO Task force 34. The SafeLane Surface Overlay is expected to provide a robust surface for more than 15 years of service, plus the much-needed pavement seal to limit chemical and moisture penetration into the concrete bridge deck. Just 34 hours after the project began, MNDOT was able to reopen one southbound lane of the site to traffic, with the second lane reopened the following morning.

MnDOT agreed to evaluate SafeLane's performance at the Hibbing test site during the next three years as part of a partnership agreement with Cargill. Chemistry professor John Evans from the University of Minnesota Duluth will analyze safety and durability, including skid testing, wear characteristics, and chloride permeability, as part of a research effort at the Northland Advanced Transportation Systems Research Laboratory.

While greater safety and less maintenance provide the most immediate benefits of SafeLane, its ability to extend the life of roads and bridges may prove to be as important an asset in the long run. For three decades, transportation departments have been using standard epoxy overlays to minimize water seepage and intrusion of corrosive agents such as chlorides. The Virginia Transportation Research Council's Sprinkel noted that SafeLane provides all the benefits of standard epoxy overlays. "However," Sprinkel added, "the specific aggregate-chemical combination in SafeLane has the additional benefit of minimizing snow and ice-related crashes as well."

Bob Persichetti, is general manager for Cargill SafeLane Surface Overlay. Copies of the Asset Insight Technologies report are available online at www.cargillsafelane.com .

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