



Accident reduction plus bridge preservation Surface overlay technology targets single solution to dual problems

Bob Persichetti

Transportation departments in 16 states are now trying a new solution to the old problem of ice, snow, and the other hazards that fall and winter driving can bring. The technology, called SafeLane surface overlay, is a patented, epoxy and aggregate overlay with a documented track record of reducing winter weather-related crashes. Equally intriguing to public works officials in the United States, United Kingdom, Canada, Russia, and other parts of the world who are testing or contemplating overlay test sites is that the overlay also seals roadbeds to prevent their degradation.

The combined potential benefits of safety plus infrastructure protection are why the Illinois Department of Transportation (IDOT) is testing SafeLane overlay on four bridges in the north-west Chicago suburb of Hoffman Estates. "IDOT constantly assesses new ways to protect the public's safety," said Sarah Wilson, IDOT bridge maintenance engineer. "These bridges, which lie along a heavily traveled commercial route, are known to have icing problems. Our goal is to reduce winter weather-related accidents. I like the added benefit of the overlay helping to prevent future chloride intrusion in the bridge decks."

An average of 30,000 vehicles cross the bridges daily. This fall, SafeLane overlay was installed on all lanes of the Illinois Route 72 (Higgins Road) bridges over I-90 (Northwest Tollway) west of Barrington Road in Hoffman Estates, and on the Illinois Route 72 (Higgins Road) bridges over the Elgin, Joliet & Eastern (EJE) Railroad. In all, the overlay was applied to 54,000 square feet.

The surface overlay acts like a rigid sponge. When transportation departments apply their standard anti-icing chemicals

prior to winter storms, the overlay stores it inside, then automatically releases the anti-icing solution as snow and ice conditions develop. The result is safer roads with better mobility because the overlay helps prevent frost or ice from ever forming on road and bridge surfaces. Plus, it improves friction for year-round traction in all weather conditions.

In 2004, SafeLane technology was licensed to Cargill. By the end of the current construction season, it's expected that

SafeLane overlay will be installed at more than 50 sites in the United States, Canada, and the United Kingdom, including both road and bridge applications, as well as at commercial venues such as sidewalks, parking lots, and airport baggage handling areas.



A thin layer of 3/8-inch-minus aggregate is spread over the epoxy. Loose aggregate is later swept from the surface.

The overlay test site in Hoffman Estates, Ill., is funded in part through a \$450,000 federal grant. IDOT originally considered using the grant money to install a fixed spray deicing system. Wilson said SafeLane overlay was ultimately chosen instead because it has no moving parts requiring ongoing maintenance.

In addition to evaluating the overlay as a bridge-preservation
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technique, IDOT will also monitor the costs versus the benefits of the technology. "One of our expectations is that by using SafeLane overlay we will need to de-ice these bridges less frequently," noted Wilson. "That will save us time and money, and will be particularly helpful on these bridges since they are among the furthest from the departure yard for our plows."

Results in Minnesota

Improved traction year-round is one of the immediate benefits motorists can expect to experience when driving across roads or bridges treated with SafeLane surface overlay. Studies at multiple overlay sites have found a 30 percent to 40 percent increase in surface friction immediately after installation. By providing increased traction, the overlay can reduce traffic delays for drivers. It can also help avoid the expense of highway shutdowns caused by weather, which is estimated in a National Academy of Science report to cost \$3.4 billion annually nationwide in freight delays alone.

Motorists are also benefiting from a noticeable reduction in winter weather-related accidents at SafeLane overlay sites. An analysis of crash data on the Highway 169 Mitchell Bridge near Hibbing, Minn., shows significant accident reduction, even during a mild winter, on bridge lanes where SafeLane overlay is installed (Figure 1).

John Evans, Ph.D., Department of Chemistry, University of Minnesota Duluth, is evaluating SafeLane overlay's performance at the Hibbing site as part of a research effort at the Northland Advanced Transportation Systems Research Laboratory. The Minnesota Department of Transportation (Mn/DOT) installed SafeLane overlay on the southbound lanes of the Mitchell Bridge in July 2006. No crashes were reported on those lanes during the winter of 2006-2007. That compares with eight occurrences on the northbound control lanes during the same time, including three crashes attributed to weather, three to unsafe or illegal speed, and two from unknown factors. One crash involved injury.

Evans evaluated crash data for the last three years and noted, "While one would be cautious of over-interpreting such small data sets, [the evidence] strongly suggests that this overlay system is strongly contributing to accident reduction."

"The purpose of this test site is to see how well SafeLane overlay increases skid resistance, how the skid resistance lasts over time, what impact the product will have on accident rates, and its performance relative to keeping de-icing chemicals out of the bridge deck," said Duane Hill, Mn/DOT assistant district engineer for operations. "This is certainly encouraging data."

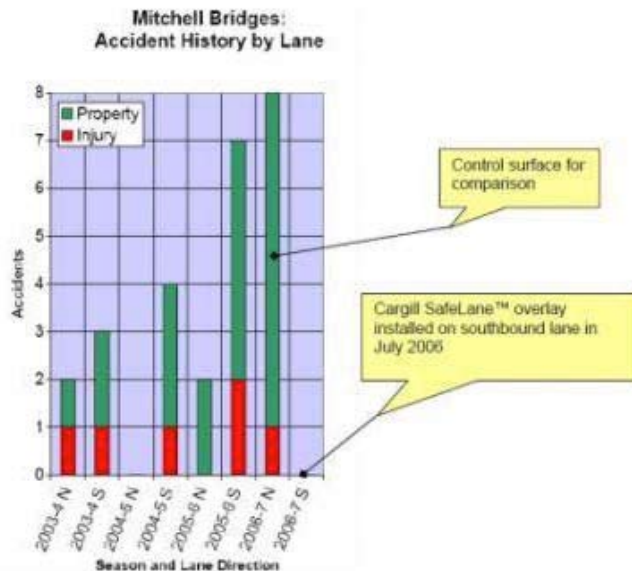


Figure 1: Analysis of crash data on the Highway 169 Mitchell Bridge near Hibbing, Minn.

This summer, Mn/DOT installed additional SafeLane surface overlay sites on bridges in Alexandria, Barnesville, and Bemidji.

Consistent safety improvement data

For the last two years, Cargill has also commissioned leading ice and snow control expert Wilfrid Nixon, Ph.D., to analyze SafeLane surface overlay's winter performance. In his 2006-2007 report, Nixon, president of Asset Insight Technologies and professor of engineering at the University of Iowa, concluded, "There is now two years of consistent evidence that improved performance by SafeLane overlay under winter conditions ... does indeed translate into safety improvements for the traveling public."

Nixon's 2005-2006 performance report found no weather-related crashes at any of the nine SafeLane overlay test sites then in place. Although cautioning that safety studies need to be conducted over a number of years to yield statistically significant results, the 2006-2007 report again found significant accident reduction rates among the 26 road and bridge test sites reporting data, including the following:

- No weather-related crashes on the Blatnik Bridge on-ramp, linking the cities of Superior, Wis., and Duluth, Minn., where there were 20 crashes during the four years before SafeLane overlay was installed in 2005.

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- No weather-related crashes on the eastbound lanes of the Ironwood Bridge on the heavily traveled U.S. 20 bypass near South Bend, Ind., which had a long history of snow- and ice-related crashes before the overlay was installed in 2005. "If I can get 36,000 vehicles over that bridge in an ice storm without any crashes, it's worth its weight in gold," noted Steve Giese, operations manager at the Indiana Department of Transportation's Plymouth sub district.
- No weather-related crashes on the Wolf River Bridge in Crandon, Wis., which averaged three to four accidents a season before SafeLane overlay was installed in 2003. "Not one call about the bridge even being slippery, much less any accidents," said Ron Cole, Forest County highway department. "I have to believe ... that by doing this bridge, we may have saved someone's life or avoided some personal injury."

Infrastructure protection

Nixon's report also highlights other safety and mobility benefits, including the following:

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. In some cases, those accumulations on control sections contributed to crashes.

- When accumulation did occur on test sections, the snow and ice did not bond to the surface as often as on the control sections, resulting in easier plowing.
- Treated segments of highway infrastructure maintained mobility for longer, and could be returned to full mobility more easily than non-treated sections. However, such gains are less likely to be observed in wet, heavy snow or other high-moisture conditions.
- There were no concerns with chemical slickness or slipperiness, even when chemical was applied in conditions where such slickness could be expected.

While greater safety and mobility are the most immediate benefits of SafeLane surface overlay, long term, its ability to extend the life of roads and bridges may prove to be as important an asset. 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 (VTRC's) Michael Sprinkel, a national expert in the design, construction, and evaluation of epoxy overlays, noted that SafeLane overlay provides all the benefits of standard epoxy overlays. "However," Sprinkel said, "the specific aggregate-chemical combination in SafeLane overlay has the additional benefit of minimizing snow- and ice-related crashes as well."

This potential for accident reduction plus infrastructure protection is why a growing number of transportation agencies are choosing SafeLane overlay as the single solution for dual problems.

Bob Persichetti, is general manager for Cargill SafeLane Surface Overlay. Copies of the reports mentioned in this article are available online at www.cargillsafelane.com.