

# TECH NEWS

## TECHNOLOGY NEWS

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## Winter driving: risks, costs, and safety strategies

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Winter snowstorms are a fact of life in the Upper Midwest, and Iowans tend to accept driving on snowy, icy roads as one of the inevitable consequences of living here. With winter approaching, now is a good time to remember the risks motorists face during inclement winter weather and redouble our efforts to keep motorists safe.

### High-risk driving

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From 1996 to 2000, almost 20 percent of all crashes in Iowa occurred during the five percent of the year (based on an average of 18, 24-hour storms) in which inclement winter weather affected road conditions. See Table 1.

Winter weather-related crash rates are even more startling.

In a CTRE study<sup>1</sup>, crash rates were calculated for sections of Iowa's Interstate highways when snowfall exceeded 0.2 inches per hour. The rates were compared to crash rates for the same highway sections (same month, weekday, and time) when the weather was clear.

When road surfaces were icy or snowy, or weather conditions were snow or sleet, crash rates were 13 times higher than during clear weather.

To put this increase in perspective, compare driving in poor winter weather conditions to another kind of risky behavior that increases a driver's crash risk: drinking and driving.

In a commonly quoted paper<sup>2</sup>, researchers reported that to increase their chances of getting into a crash by 13 times, they would need a blood alcohol content (BAC) of about 0.13.

This is much higher than the legal BAC for impairment in every state. Most states, including Iowa, have significant legal sanctions for drivers caught with a BAC at 0.13.

### Trip deferrals

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Both number of crashes and crash rates increase during inclement winter weather even though fewer travelers are on the road during snowstorms. As visibility declines to a quarter mile, as many as 80 percent of road trips are cancelled<sup>3</sup>.

The number of trips deferred depends on trip type. People who drive as part of their job have less discretion about canceling trips.

Commercial vehicle operators, for example, are less likely than other drivers to cancel trips due to bad weather. Therefore, as shown in Table 1, a disproportionately high percentage of winter weather-related crashes involve trucks.

**Table 1. Comparison of Winter Weather-related Crashes to All Crashes: 1996 to 2000**

	All Crashes			Winter Weather Crashes			
	No. of Crashes	Average Severity	Average Loss	No. of Crashes	Percent of Total Crashes	Average Severity	Average Loss
Commercial vehicles	22,048	13.6	\$39,103	4,962	23%	11.5	\$33,860
All vehicles	342,732	9.4	\$19,374	64,410	19%	7.7	\$15,866

Source: Iowa DOT crash data; Iowa Traffic Safety Data Service

## Traffic speeds

Motorists do tend to slow down during inclement winter weather—but not all that much.

A study of traffic data from the Twin Cities Metropolitan Area freeway system shows average decrease in speeds of 8 to 10 percent for snowfalls of less than 0.1 inch per hour and more than 0.1 inch per hour, respectively. See Table 2.

**Table 2. Summary of Capacity Analysis**

	Capacity	Speed
<b>Clear weather</b>	2,400 vph	65 mph
<b>Snows less than 0.1 inch per hour</b>	2,000 vph (17% reduction)	60.6 mph (8% reduction)
<b>Snows greater than 0.1 inch per hour</b>	1,800 vph (25% reduction)	58.7 mph (10% reduction)

Source: Maze T.H., Integration of Road Weather Information with Traffic Data (preliminary results), Aurora pooled-fund project

As part of an evaluation of Iowa’s Maintenance Decision Support System, CTRE shot some local traffic video that indicates how much Iowa drivers reduce their speeds during snowstorms. Traffic on the U.S. Highway 30 bypass around Ames was videotaped from the State Street bridge<sup>4</sup>. This is a fully access-controlled, four-lane, divided highway.

Traffic speed data were collected via video during two different storms. The first storm was light, and the Iowa DOT was doing a great job of keeping the roadway clear. See Figure 1. Average vehicle speed was 70.6 miles per hour.

The second storm was more severe, and the Iowa DOT was unable to keep the roadway clear. See Figure 2.

During data collection, when the roadway was mostly ice covered, the average speed was 62 miles per hour. One vehicle was recorded at 89 miles per hour.

The average speed reductions were rather meager compared to the stark differences in the pavement surface conditions shown in Figures 1 and 2.

## Highway capacity

Figure 1. Video of traffic on U.S.



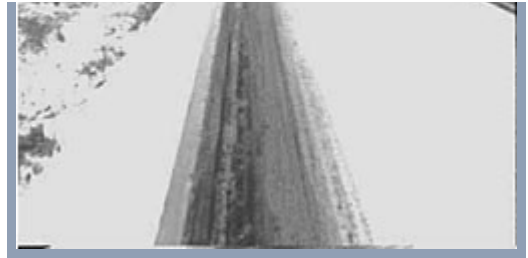
Highway 30 bypass from State Street bridge (Ames) during light snowstorm

Figure 2. Video of U.S.



In the Twin Cities study, highway capacity dropped during inclement winter weather—from 17 to 25 percent for snowfalls of less than 0.1 inch per hour and more than 0.1 inch per hour, respectively. See Table 2.

The drop in capacity exceeded the drop in traffic speeds, indicating that drivers are increasing headway between vehicles.



Highway 30 bypass from State Street bridge (Ames) during heavier snowstorm

## Crash severity

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Some people argue that, while winter crashes are more frequent, vehicles are traveling at lower speeds and, therefore, crashes are less severe.

Winter weather-related crashes in Iowa do appear to be less severe, but not significantly—only about 15 percent. See Table 1.

## Bottom line

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Snowstorms have a significant impact on roadway performance and impair motorists' ability to drive safely. During snowy winter weather, drivers tend to increase their headways but moderate their speeds only slightly.

Enhancing winter roadway safety for motorists therefore requires a combined effort involving the three Es: education, enforcement, and engineering.

## Driver education

Drivers—including commercial vehicle operators—need to

- be better educated about the increased risk they're assuming for themselves, their passengers and loads, and other travelers when they drive during snowstorms.
- learn how to drive during snow and ice events: reduce speeds, increase headway, etc.
- know how to access weather-related traveler information systems so they can make more informed choices about where and when to drive.

## Law enforcement

Officers need to ticket individuals for driving at unsafe speeds for winter roadway conditions. Judges need to understand the safety challenges of drivers traveling at speeds above those warranted by road conditions.

## Roadway design

Designers need to understand and implement roadway design elements to mitigate the effects of winter storms. For example, designing and building the roadway to slope into the sun can reduce ice formation. Designing with an understanding of prevailing winds can reduce snow blowing across the roadway and snow removal.

## For more information

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For information about the study, contact Tom Maze, 515-294-9459, [tmaze@iastate.edu](mailto:tmaze@iastate.edu).

### Notes

<sup>1</sup> Knapp K.K., Kroeger D., and Giese K., *Mobility and Safety Impacts of Winter Storm Events in a Freeway Environment*, Center for Transportation Research and Education, Iowa State University, 2002

<sup>2</sup> Compton R.P., Blomberg R.D., Moskowitz H., Burns M., Peck R.C., and Fiorentino D. Crash Risk of Alcohol Impaired Driving. In *Proceedings of the 16th International Conference on Alcohol, Drugs, and Traffic Safety, Montreal, Canada, August 4–9, 2002*, Montreal: International Council on Alcohol, Drugs, and Traffic Safety, 2002

<sup>3</sup> Maze T.H., Burchett G.D., and Hawkins N.R., *Using Data to Predict Relative Road Safety and Requirements for Road Closures During Severe Winter Weather Conditions*, prepared for presentation at the Transportation Research Board, Washington, D.C., January 2005

<sup>4</sup> Andrie S.J., Kroeger D.A., and Sinha R., *Deploying the Maintenance Decision Support System (MDSS) in Iowa*, Center for Transportation Research and Education, Iowa State University, November 2003

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