SAFE TRUCK MOBILITY for NORTH DAKOTA WINTER ROADS

Winter storms significantly increase crash risk and disrupt travel, especially under extreme conditions. Gusty winds, heavy moisture, and low temperatures can quickly make travel dangerous in the Northern Plains. Crash analysis revealed key features and contributing factors. Peer states, including South Dakota and Wyoming, shared winter road management processes, enforcement practices, road closure decisions, education programs, and communication practices. Proactive planning, policy, and resource deployment can minimize travel. While limited geography, the study informs other states about safe truck mobility during dangerous winter storm events.

OBJECTIVES

- Highlight winter storm truck crash risk and traffic management in North Dakota,
- Investigate contributing factors, policies, decision processes, and strategies for safe truck mobility during winter storm crash prevention,
- Explore peer state procedures, decisions, and communications related to proactive winter storm truck traffic management and incident response,
- Query local truck experts about winter storm policies and driver guidance, and
- Highlight Safe System mobility strategies for trucks and surrounding traffic to minimize travel disruption and crash risk during winter storm events.


image source: NDDOT

DATA AND METHODOLOGY

Winter truck mobility was studied in a Safe System context with an investigation of North Dakota's primary east-west traffic corridor.

DATA

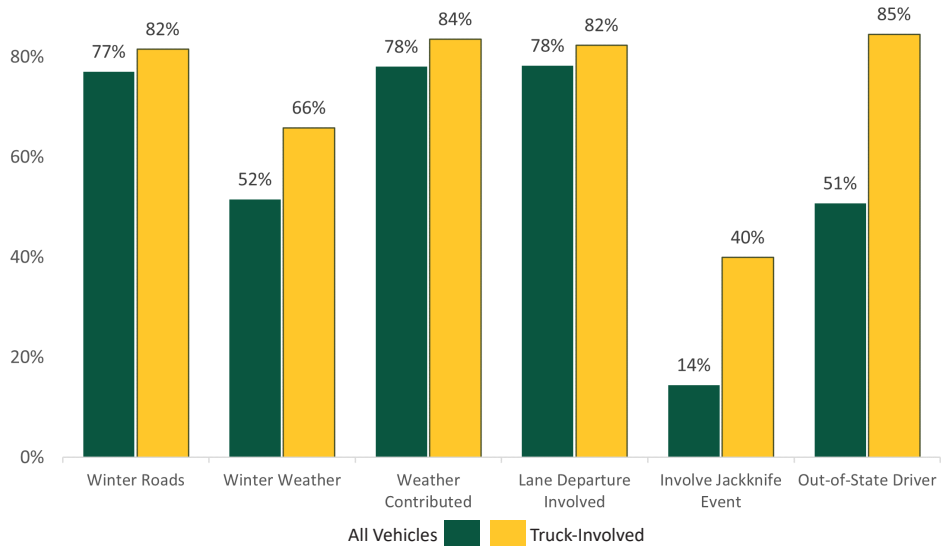
Analysis of 594 truck-involved crashes among 2,105 crashes on Interstate 94 during winter months over a five-year period (January 2019–December 2023: January, February, March, November, and December).

METHODS

- Literature review context for winter storm safe mobility challenges and strategies to mitigate crash risk and travel disruptions.
- Statistical analysis revealed key crash features and contributing factors.
- Case study analysis highlighted the sequence and nature of truck-involved crashes during a severe winter storm that involved interstate closure.
- A peer state and intrastate agency interview exercise for insights/ideas.

CRASH FACTOR REPORTING (PERCENT OF WINTER CRASHES)

Source: NDDOT State TraCS Reports



I-94 Crash Factors (table version)

Crash Factors	I-94 Crashes for All Vehicles	I-94 Truck Crashes
Winter Weather Conditions	78%	83%
Winter Roads (Ice/Frost, Snow or Slush)	77%	81.5%
Winter Weather (Snow, Blowing Snow, Freezing Rain, Sleet or Hail)	51.5%	65.8%
Lane Departure	78.2%	82.3%
Jackknife Event	14.4%	39.9%
Out-Of-State Driver Involved Crashes	50.7%	84.5%

FINDINGS

Several proactive opportunities for safe mobility during winter storm events were evident. The literature review was used for context in discussing winter storm truck safety challenges and countermeasures. Discussions with subject matter experts revealed communication as an evident key in this planning, dynamic decision processes, and public awareness.

Safe Users

- Winter driving information safe mobility campaign – public, businesses
- Out-of-state truck driver/company education
- Driving app and/or dispatch centers prevent secondary road re-routing
- Resources for truck drivers with small community storm diversions
- Truck parking inventory/information

Safe Speeds

- Greater storm event visibility in real-time and geographic coverage
- Weather stations/cameras/road sensors/ traffic recorders
- Coordination with neighboring states in communications, technology, and policies
- Planning closures with lead time for truck parking
- Blow off/blow over vehicle type policy, consider speed and weight

Safe Roads

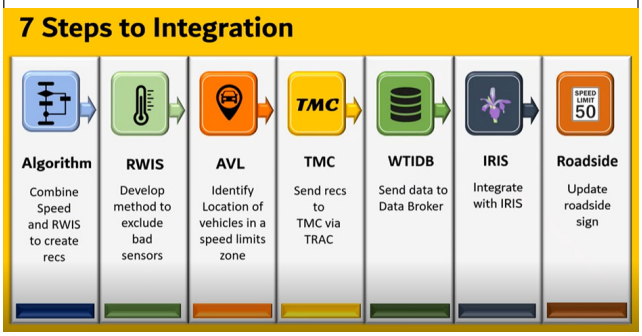
- Periodic desktop planning exercise as an emergency response to severe winter storms
- Communicate road closures with the general public and the truck industry
- Real-time information at rest stop kiosks/ general updates on reopening roadways
- Living snow fences, timely road clearing/ coordinated operation, winter plowing techniques, DMS
- High friction surfaces, rumble strips, cable median barrier, guardrail, improved road closure gates, reliable equipment
- Web portal emergency communications for shared communication stream

Safe Vehicles

- Truck permit system for travel alerts
- Tiered penalty approach for companies with winter storm-related violations
- Post-Crash Care
- Law enforcement crash response challenges beyond major travel corridors
- Access to EMS and hospital care during winter storm events

VARIABLE SPEED LIMIT CORRIDORS

Implementing a speed limit change has seven steps, starting with an algorithm developed by the U of Wyoming and the Wyoming DOT. The algorithm considers several factors, including road surface temperature, humidity, visibility, and stopping sight distance. The integration process uses IRIS (intelligent roadway information system) to push the speed change to the signs in the field. Highway patrol or highway department personnel can also advise on the speeds.



SEVERE WINTER STORM EMERGENCY RESPONSE EXERCISE: BARNES COUNTY TABLETOP

Barnes County Dispatch/EMS Organizers

In an open discussion format, key agencies and critical responders were presented with a severe winter storm scenario. A storm caused near-zero visibility, stranded motorists, and overwhelmed local accommodations for an extended duration. Participants shared their roles, procedures, capabilities, experiences, and available resources in response to severe winter weather. The discussion covered critical topics such as road closures, assisting stranded motorists, managing high-risk areas, ensuring emergency mobility during closures, and safely and efficiently reopening roadways to conclude the scenario. The casual, participatory format was valuable in the process of maximizing safety and minimizing mobility disruptions from severe winter weather. The group had several learning points: policy clarification, standard operating process refinement, TIMS training/ participants, and critical state information streams.

This research was funded by the North Dakota Highway Patrol.

View the complete report here