

# MOUNTAIN-PLAINS CONSORTIUM

RESEARCH BRIEF | MPC 22-489 (project 598) | September 2022

## Assessing the Effectiveness of the Wyoming Connected Vehicle Pilot Program: New Traffic Safety Research Perspectives



### the **ISSUE**

I-80 in Wyoming is a segment of an east/west rural corridor in the U.S. northwest, supporting the movement of over 32 million tons of freight per year. The corridor is also characterized by severe weather conditions, i.e., strong winds, heavy snow and fog, severe blowing snow, and low visibility. To mitigate these safety concerns, the USDOT FHWA selected I-80 in Wyoming (the WYDOT CV Pilot) as the only rural site among three connected vehicle (CV) pilot sites designed to showcase the value and spur the adoption of CV technology. The Wyoming CV systems and applications that were developed—mostly vehicle-to-vehicle, vehicle-to-infrastructure, and infrastructure-to-vehicle communication—are expected to enable CV drivers to have improved awareness of potential hazards when driving on I-80, help fleet managers better manage their freight operations, and support WYDOT Traffic Management Center staff to implement more effective traffic control strategies. Measures were needed to quantify the extent and impact of these benefits.

### the **RESEARCH**

This study provides a new traffic safety perspective for the safety performance evaluation of the WYDOT CV Pilot through advanced statistical modeling, machine learning, data mining applications, safety data visualizations, high-fidelity driving simulator experiments, and traffic microsimulation modeling. Analytical inference for developing a baseline and analysis, modeling, and simulation (AMS) framework are developed based on using two distinct but complementary approaches: conducting a before/after analysis to explore crash/crash severity causations during CV pre-deployment as a baseline, and utilizing the AMS framework in with/without analyses to quantify drivers' behavioral alteration under the effect of various CV applications.



A University Transportation Center sponsored by the U.S. Department of Transportation serving the Mountain-Plains Region. Consortium members:

Colorado State University  
North Dakota State University  
South Dakota State University

University of Colorado Denver  
University of Denver  
University of Utah

Utah State University  
University of Wyoming



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### Project Title

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### Sponsors | Partners

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## the FINDINGS

Results unveiled statistically significant real-time traffic-related factors contributing to crash and critical crashes during CV pre-deployment. In the with/without analysis, and based on the calibrated and validated AMS framework, the impact of several CV applications was analyzed, including spot weather impact warning, distress notification, situational awareness, CV variable speed limit, work zone warning, forward collision warning, and rerouting applications. According to the quantification of drivers' behavioral alterations under various CV notifications utilizing trajectory-level analyses, results affirmed the promising safety effects of CV applications. In addition, the surrogate measures of safety analysis in microsimulation modeling indicated an enhanced traffic safety performance under various CV market penetration rates.

## the IMPACT

This study formulates crucial first steps in identifying the issues associated with integrating CV technology into roadway operational strategies. The main challenge of CV is assessing its effectiveness objectively from operations and safety perspectives. The expected impact of this project is to improve the safety and efficiency of roadway networks via better understanding of how evolving technologies will affect transportation engineering.

For more information on this project, download the Main report at <https://www.ugpti.org/resources/reports/details.php?id=1262>

For more information or additional copies, visit the Web site at [www.mountain-plains.org](http://www.mountain-plains.org), call (701) 231-7767 or write to Mountain-Plains Consortium, Upper Great Plains Transportation Institute, North Dakota State University, Dept. 2880, PO Box 6050, Fargo, ND 58108-6050.



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