

UTC Project Information	
Project Title	MPC-574 – Proposing New Speed Limit in Mountainous Areas Considering the Effect of Longitudinal Grades, Vehicle Characteristics, and the Weather Condition
University	University of Wyoming
Principal Investigator	Anas Alrejjaal Amirarsalan Mehrara Molan Khaled Ksaibati
PI Contact Information	<p>Amirarsalan Mehrara Molan, Ph.D., P.E. Lecturer California Polytechnic State University Phone: (805) 756-2947 Email: amolan@calpoly.edu ORCID: 0000-0002-8540-1174</p> <p>Anas Alrejjaal, MSc. Graduate Research Assistant University of Wyoming Phone: (307) 761-3899 Email: aalrejja@uwyo.edu ORCID: 0000-0003-1661-6697</p> <p>Khaled Ksaibati, Ph.D., P.E. Professor University of Wyoming Phone: (307) 766-6230 Email: khaled@uwyo.edu ORCID: 0000-0002-9241-1792</p>
Funding Source(s) and Amounts Provided (by each agency or organization)	<p>USDOT, Research and Innovative Technology Administration \$81,000</p> <p>Wyoming Department of Transportation \$81,424</p>
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Agency ID or Contract Number	69A3551747108
Start and End Dates	July 3, 2018 to July 31, 2022
Brief Description of Research Project	The current method of Green book (AASHTO 2011) for assigning design speed (and consequently for speed limit) of roads is based on a point-mass model. Therefore, many effective variables such as longitudinal grades, vehicle characteristics, and weather condition are ignored. This fact creates serious safety problems in mountainous areas since, where these missing parameters are dominant. The condition becomes even worse because many of the mountainous roads were built many years ago based on the old design methods (for example, with the downgrades sharper than 10%). This project

	<p>seeks to study the effect of different parameters related to geometric features (including the radius of the horizontal curve, superelevation rate, and longitudinal grade), vehicles characteristics (including type, weight, and the braking forces), and the weather condition (including side friction factor, wind speed, and wind direction). This analysis will be conducted using a comprehensive series of TruckSim and CarSim simulation tests on the most hazardous mountainous roads in Wyoming. Afterward, appropriate values of speed limit will be proposed for roads tested in the study. Also, new analytical models will be presented to be practical for the rest of the roads (not considered in the study) based on their geometric features, design vehicle, and weather condition.</p>
<p>Describe Implementation of Research Outcomes (or why not implemented)</p> <p>Place Any Photos Here</p>	<p>The proposed framework and assessment will assist Wyoming’s roadway authorities in imposing more appropriate speed limits for vehicles on hazardous sections based on the weather conditions and vehicle configurations. Furthermore, the results would be beneficial for companies developing automated trucks.</p>
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<p>This research provided guidelines regarding the design of road sections with combined (horizontal and vertical) alignments and the implementation of safety countermeasures on existing curved roads. The study offered a holistic design framework for safe vehicle speeds on combined curves with respect to lateral and roll stability including vehicle configurations (weight/ truck load height) and wind parameters (speed and direction). This study filled the gap in the literature regarding the impact of these key factors on vehicle stability and how to assign appropriate speed limits on these challenging sections.</p>
<p>Web Links</p> <ul style="list-style-type: none"> • Reports • Project Website 	<ul style="list-style-type: none"> • MPC Research Report – Proposing New Advisory Speeds in Mountainous Areas Considering the Effect of Longitudinal Grades, Vehicle Characteristics, and the Weather Condition • Journal Paper – Impact of Crosswinds and Truck Weight on Rollover Propensity When Negotiating Combined Curves • Journal Paper – Impact of Mountainous Interstate Alignments and Truck Configurations on Rollover Propensity • Journal Paper – Investigating Factors Influencing Rollover Crash Risk on Mountainous Interstates • Journal Paper – A Correlated Random Parameters Approach to Investigate Large Truck Rollover Crashes on Mountainous Interstates