

Developing Operation and Maintenance Recommendations for Runway Truck Ramps

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The highway downgrades for heavy trucks generate a potential safety risk and disruption for truck operators, other road users, and both the natural and built environments. Highway steep grades can also cause harmful effects on the brakes, gears, and power systems that result in brake overheating, failures, and excessive speed. The increase in the number of trucks and their average weight in interstates has also amplified the crash risk on the downgrade areas. The competition among commercial transport companies and reduced profit margins may result in the lack of proper maintenance, which may also influence the crash risk. An analysis of the incident reports of Colorado Department of Transportation (CDOT) discovers that two vehicle incidents per month were reported in runaway truck ramps. This result was the product of analyzing 341 incidents reported in the thirteen-year period between 2005 and 2017. Of these total incidents, 263 incidents involved truck usage of the ramp or an average of about 1.7 uses per month. More importantly, three severe accidents on emergency escape ramps were reported in this state, resulting in jackknife or rollover of the rig accompanied by fire and/or hazardous waste spills. Subsequently, the need for effective operation and maintenance best practices of runaway truck ramps arises to sustain a highway system, which effectively and safely moves people, goods, and information.

The overall goal of this research is to develop a set of operation and maintenance recommendations to reduce the number of rollover, jackknife, and rollback end positions for trucks entering runaway truck ramps. Specifically, the objective of this research poster is to present preliminary results regarding the development of recommendations to increase the effectiveness of operation and maintenance practices that increase in the performance of runaway truck ramps. The research approach of this study consists a review of the literature, appraisal of incident reports during the last 10 years, field observations at four emergency escape ramps in a heavily transited mountain interstate, and interviews with interstate stakeholders. The literature review of the study provides an overview of the current body of knowledge related to runaway truck ramps. It was found that the operation and maintenance criteria of runaway truck ramps were limited to specific DOTs. The analysis of the incident reports of the CDOT allows identifying the usage frequency of the ramps in the mountain interstate. Finally, the field observations and interviews provided a better understanding of the current condition of runaway truck ramps as well as their operation and maintenance needs.

The products of this research are a series of recommendations focusing on maintenance/material replacement, signage and pavement marking, and lighting. Specific recommendations to be implemented by the CDOT include aggregate replacement, developing a maintenance schedule for arrester beds, entrance reconstruction of the arrester beds, updating the ramp service road to asphalt material, improving clear zones such as removing vegetation, improving both horizontal and vertical signage, and the addition of guardrails as well as considering the usage of wildlife lighting. Based on the results, the research team also recommend installing a camera at the entrance of the ramps, allowing to better record the incidents and takes photos of the license plate.

Having this set of recommendation allows to develop an implementation plan for this specific CDOT as well as sharing best practices with other DOT agencies. The implementation plan is expected to keep the driver safe and the truck and trailer upright. The plan can benefit freight carriers through improved driver safety and freight security, the traveling public through fewer “runaway trucks.” Finally, future studies are recommended to evaluate aggregate contamination on these four ramps as well as evaluating the design and operation of other ramps that have heavy usage.

Keywords: Emergency escape ramp , truck escape ramp, vehicle arrester bed, maintenance, escape ramp safety