UTC Project Information	
Project Title	Implications of Truck Platoons for Roadside and Vehicle Safety Hardware
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Funding Source(s) and Amounts Provided (by each agency or organization)	Safe-D (Federal): $179,295 Match (Non-federal): $122,302
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Start and End Dates	January 1, 2017 and May 31, 2018
Brief Description of Research Project	Platooning is an extension of Cooperative Adaptive Cruise Control (CACC) that realizes automated lateral and longitudinal vehicle control while moving in tight formation with short following distances. It is unknown whether the capacity and adequacy of existing roadside safety hardware deployed at strategic locations is sufficient to resist a potential impact from a fleet of multiple truck platooning at high speed, which may occur as a result of errant truck platoons. It is unknown how these impacting trucks might interact with roadside safety barriers after leaving their platoon and what are the occupant risks associated with such impacts. This research will identify and prioritize the critical MASH TL5 roadside safety device(s) for truck platooning impact assessment in order to understand the associated roadside and occupant risks and hazards. Finite element models of the trucks and roadside safety device/s will be examined using multiple computer simulations for

	multiple scenarios. The injury risks of occupants during truck collision simulations will be assessed using dummy and human finite element models. The results and implications will be critical to understand if any roadside safety device improvements and/or platooning constraint modifications will be necessary before implementing truck platooning. It is expected that the outcomes of this research will be of particular interests for future and current transportation industry and agency leaders, students, professionals, researchers and DOT's personnel involved with the selection of roadside safety hardware for deployment at critical locations where truck platooning will be allowed.
Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	The PIs for this proposed research effort propose the opportunity for a student exchange program across the participant universities to integrate knowledge and technical capabilities within the program's participants. This may involve visiting the partner participant university for a week and understanding the technology, tools and approach being used for the purpose of this project. This student exchange program is expected to occur towards Fall 2017 or Spring 2018. A one hour presentation will be developed using the procedures and outcomes of the project which can be used as course material for a lecture – it will target undergraduate and graduate engineering students. Articles will be prepared for consideration and publication in peer-reviewed journals based on the outcomes of the research which can be a source of additional information for students as well professionals. This research will involve graduate research assistant(s) who will complete the graduate thesis on subjects developed within this study. The proposed research will develop the understanding of the involved student/s on truck platooning technology, roadside safety device design, related standards, modeling, drafting and finite element analysis. These aspects of the project are directly or indirectly related to the curriculum followed by the student(s) and the research thesis will count as up to 7 credits towards the degree. Involvement of student researchers in the project, and presentations and course materials for other student audiences can help introduce truck platooning technology to the new generation; it can ignite grown interest in transformative transportation technology. Also, as this project is not exhaustive, the outcomes of this research can lead to additional detailed and complementary funded researches, this will bring new opportunities for future student researchers. The results of this research will be developed into presentations for appropriate audiences at venues such as AASHTO committee meetings, ATSSA, TRB, AASHTO Task Force 13, etc. Opportunities to present at the Traffic Safety Conference and other conferences related to truck platooning and roadside safety devices will be particularly important in sharing the outcomes of this research to professionals and researchers who can relate to this project. The results will be developed into multiple articles for consideration and publication in

	peer-reviewed journals. Videos will be included in the presentations so that the material presented is more informative. Project results will position the team well for future potential funding from other agencies. The National Highway Traffic Safety Administration (NHTSA), Federal Highway Administration (FHWA), Federal Motor Carrier Safety Administration (FMCSA), American Traffic Safety Services Association (ATSSA), and American Association of State Highway and Transportation Officials (AASHTO) are few other examples of federal agencies which may be interested in outcomes of this research –they will possibly additional opportunities for funding future investigations of interaction between roadside safety hardware and automated /connected vehicles to determine countermeasures for any potential risk involved. Deliverables: Final Dataset and Metadata Uploaded to VTTI Dataverse Development of Finite Element Computer Models Project Outcomes Recommendations Learning and technology transfer materials (presentations, videos and journal/ conference papers)
Impacts/Benefits of Implementation (actual, not anticipated)	It is expected that the outcomes of this research will be of particular interests for DOT's personnel involved with the selection of roadside safety hardware for deployment at critical locations where truck platooning will be allowed and vehicle manufacturers for improving occupant safety, as well as for those involved in the road and vehicle design areas. For example, roadside device hardware design recommendations included in the outcomes of this research will be considered for inclusion in the next revised edition of the AASHTO's Manual for Assessing Roadside Hardware (MASH) standards.
Web Links • Reports • Project website	http://www.vtti.vt.edu/utc/safe-d/index.php/projects/implications-of-truck-platoons-for-roadside-and-vehicle-safety-hardware/