# 2021 RESEARCH PROJECT STATEMENT

**Research Topic:**
Uncovering the Root Causes to Truck Rollover Crashes on Ramps

**Research Budget and Timeline:**

- $90,000-$120,000
- 12-15 months (of which final 3 months are for review)

**Problem Statement and Objectives**
In the United States, large truck related crashes account for about 4% of total crashes, but 8% of total fatal crashes. Crashes involving trucks usually occur on highways and tend to have significant and large-scale impacts on highway network performance. In 2016 alone, truck related crashes in Massachusetts resulted in losses of over $22M in terms of delay time and $1.7M due to emissions and wasted fuel consumption. Nationwide, approximately 11% of total truck crashes were on highway ramps and 44-52% of them involved rollovers.

The proposed research aims to (1) review literature and best practices on reducing highway ramp truck rollovers; (2) analyze historical ramp truck rollover data in Massachusetts; (3) focus on utilizing existing traffic cameras on state-maintained highways and advanced video analytics tools to uncover the causes of truck rollovers on highway ramps and derive surrogate safety performance measures; and (3) establish correlations between truck rollovers and ITS devices, signage and markings, and roadway design practices.

**Anticipated Outcomes and Deliverables**
• A literature review report will be prepared to document recent best practices and research efforts to reduce truck rollover crashes on highway ramps. The review report will provide recommendations on promising strategies to be implemented in Massachusetts;

• A detailed analysis of ramp truck rollover crashes in Massachusetts will be performed. The analysis report will highlight the main truck rollover contributing factors and link them with the recommended strategies in the literature review report;

• An algorithm for analyzing traffic camera videos will be developed to identify truck related crashes and near-crash events on highway ramps. The algorithm will be utilized to analyze traffic camera videos collected from ramps on state-maintained highways, and the analysis results will be documented and compared to the previous two deliverables; and

• Surrogate safety performance measures will be generated based on the video data. Such measures will be used to evaluate the effectiveness of various ITS devices, signage and markings, and roadway design practices implemented on state-maintained highways to reduce truck rollover risk on highway ramps. The findings will be documented.

Final Deliverables:

1. Final Report
2. Final Presentation