

Request for Research Funding for FY 2022-2023

SPR Subpart B Project: TEO-23-13

Requesting Office	D7 Traffic Ops & Safety Offices	Priority	13 of 23
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Proposed Title Strategies to Address Head-on Crashes

A head-on crash typically occurs when a vehicle crosses the centerline or a median and hits the oncoming vehicle. It can also occur when a driver travels the wrong way in a traffic lane. Head-on crashes are often catastrophic as they create the greatest force of impact because of the relative velocity of the vehicles traveling in opposite directions. In the last five years, while head-on crashes accounted for 2.95% of total crashes on state roads in Florida, they accounted for a high 8.05% of all fatal crashes. Head-on crashes are often caused by drunk driving, driver distraction, speeding, and illegal passing. As such, all the *5Es* (i.e., Engineering, Education, Enforcement, Emergency Medical Services and Encouragement) play a critical role in mitigating the frequency and severity of head-on crashes.

The goal of this research project is to develop strategies to address head-on crashes in District Seven. This goal will be achieved by first understanding the contributing factors leading to head-on collisions and then using this knowledge to identify and recommend effective countermeasures and strategies to address these crashes. Accordingly, the specific project objectives include:

1. Review and summarize existing literature on head-on crashes.
2. Identify specific contributing causes, roadway/geometry factors, and patterns of head-on crashes.
3. Estimate Crash Modification Factors (CMFs) to assess the safety effects of common engineering treatments to mitigate head-on crashes.
4. Develop near-term and long-term countermeasures with implementation action plans.
5. Disseminate research results to the state and district officials.
6. Prioritize head-on crash segments in FDOT D7.

Justification

Review Existing Literature
A comprehensive literature review of existing studies on head-on crashes will be conducted. The review will focus on risk factors affecting the propensity of head-on crashes; crash causes, patterns, and contributing factors related to the roadway, environment, vehicle, and driver; and safety performance of engineering countermeasures.

Identify Crash Causes and Patterns
Head-on crash causes and patterns will be identified through multiple approaches using the most recent three years of crash data. First, descriptive statistics related to roadway geometry, environment, driver, and vehicles will be presented. These statistics will help identify the overall statewide head-on crash patterns and contributing factors. Second, police reports of all fatal and serious injury head-on crashes that occurred during the three-year analysis period will be downloaded and reviewed. This detailed review of police reports will help obtain additional crash details, including those from police descriptions and illustrative sketches, which are not available from crash summary records. Third, spatial analysis will be conducted to guide efforts to develop systemic projects to proactively implement head-on crash remediation measures in Florida. Finally, the results from the three approaches will be combined to obtain insights on head-on crash causes, contributing factors, and patterns.

Estimate Crash Modification Factors (CMFs)
As a first step, the most common countermeasures to address head-on crashes will be identified. If sufficient data are available, Florida-specific CMFs will be developed. For the countermeasures for which sufficient data are not available, the most suitable CMFs from the CMF Clearinghouse will be recommended. When multiple CMFs are available, meta-analysis will be conducted to obtain a single value from multiple studies.

	<p><i>Develop Near-term and Long-term Implementation Action Plans</i> Based on the location-specific (i.e., spot) and systemic countermeasures identified, implementation items will be prepared. Even though <i>Engineering</i> may be considered as the lead “E” in addressing head-on crashes, the other <i>Es</i> (i.e., Education, Enforcement, and Emergency Services) also play a critical role. Hence, the near-term and long-term implementation plans will focus on all the 5Es of traffic safety. The action plans will also include the processes (e.g., performance measures) and tools (e.g., crash data analysis) to mitigate head-on crashes.</p> <p><i>Disseminate Research Results</i> The results will be presented at meetings and conferences, as suggested by the Project Manager. Some of the avenues where the research results could be disseminated include FDOT Vital Few Safety, FDOT Transportation Symposium, Florida Local Technical Assistance Program (LTAP), FDOT Community Traffic Safety Teams (CTST) meetings.</p>		
Impact	Head-on crashes are a serious safety concern in District Seven and across Florida. Addressing this issue continues to be one of the top safety-related goals. This project will help reduce head-on crashes by identifying crash causes, patterns, and contributing factors and recommending proven and effective low-cost systemic countermeasures. Furthermore, the recommended near-term and long-term implementation action items will provide the agencies with a plan to address head-on crashes.		
Affected Offices	State Safety Office; State Traffic Engineering and Operations, Roadway Design & System Planning Offices		
Existing Work	A literature search suggests that the proposed study has not been previously done in the state, given the diverse objectives the study sets to achieve. At the national level, the NCHRP Report 500 Volume 4 focused on head-on crashes – but this report is almost 20 years old.		
Keywords Used In Existing Work Search	<ul style="list-style-type: none"> • Head-on crashes: none 		
Related Contracts	<ul style="list-style-type: none"> • None 		
Funding Request	\$175,000	Anticipated Duration	18 months
Project Manager	JoEllyn Guthrie, P.E. District Traffic Services Engineer, District 7	Contracting Method	Direct contract with Florida International University.
Equipment	Estimated equipment cost (or N/A)	Not Applicable	
Urgency	1	District Seven has recently seen an increase in head-on crashes. This project will provide the necessary resources to strategically address head-on crashes.	
Implementability	1	The research results will be readily implementable. The recommended strategies and the near-term and long-term implementation action items will be readily available for adoption.	
Project Benefits (Succinct, complete explanation)			
<ul style="list-style-type: none"> ✓ A clear understanding of the factors contributing to head-on crashes ✓ Specific CMFs that could be used to mitigate head-on crashes ✓ Near-term and long-term implementation plan to address head-on crashes 			
Project Benefits	Quantifiable Benefits (units, dollars, etc...if applicable)	Methodology or Data Sources Used to Determine Quantifiable Benefits. If not applicable, please give justification of project benefits	

(Select all that apply and explain)		
<input type="radio"/> Materials Enhancement		
<input type="radio"/> Materials Savings		
<input type="radio"/> Time Savings		
<input type="radio"/> Lives Saved/Injuries Prevented	CMF could be used to estimate the reduction in head-on crashes	The study results, once implemented, will reduce the frequency and severity of head-on crashes.
<input type="radio"/> Other (Explain)		

*Comments should explain and support urgency, financial benefit, and implementability scores