

## Request for Research Funding for FY 2025-2026

**Project Number** (Research Center Use Only): TEO-26-05

<b>Requesting Office</b>	State Traffic Engineering and Operations	<b>Priority:</b> High	5 of 12
<b>Proposed Title</b>	Strategies to Address Gaps in Safety Analysis of Intersections		
<b>Justification</b>	<p>Intersections are among the most dangerous locations in a road network; approximately 35% of traffic fatalities and serious injuries in Florida over 2018-2023 are associated with intersection-related crashes<sup>1</sup>. The Florida Department of Transportation (FDOT) has therefore identified intersections as one of the emphasis areas within its Strategic Highway Safety Plan (SHSP)<sup>2</sup>. With over 9,000 signalized intersections and approximately 35,000 unsignalized intersections on the State Highway System (SHS), addressing safety at these critical locations is important.</p> <p>Network screening, the first step in the roadway safety management process, is a process for reviewing a transportation network to identify and rank sites with the greatest potential for safety improvement. While the Highway Safety Manual (HSM) discusses several network screening methods, it recommends using crash prediction-based method (also known as predictive method) for reliable estimation of safety performance. The core of the predictive method is safety performance functions (SPFs), which establishes a relationship between crash frequency and roadway geometry, environment, and traffic features. One of the data requirements for the safety analysis of signalized intersections using SPFs is major and minor road Average Annual Daily Traffic (AADT) or total entering AADT. FDOT adopted the predictive method to perform an annual network screening of signalized intersections on the SHS and identify candidate locations for safety improvement. However, one limitation of this effort lies on being unable to perform network screening on the entire network of signalized intersections due to missing AADT data on minor roads. At the same time, unavailable AADT data on minor roads are the major hurdle to extend the network screening effort to major crash-prone unsignalized intersections on the SHS. There are two ways of addressing this issue of missing minor road AADT data. While one approach estimates the missing AADTs, the other explores related variables and identifies surrogate measures to estimate the exposure at signalized intersections. Now, the question would be which of these two approaches is better and how well the surrogate measures would work when the minor road AADT data are available. In summary, the AADT-based and non-AADT-based models, the two approaches to screening signalized intersections for the potential for safety improvement, will most likely yield different outputs, questioning the robustness of the two approaches.</p> <p>This research aims to provide recommendations on performing network screening of signalized intersections based on the availability of minor road AADT data. The specific objectives include:</p> <ol style="list-style-type: none"> <li>1. Identify variables and surrogate measures to estimate the exposure at signalized intersections.</li> <li>2. Develop the approach to screen signalized intersections when minor road AADT is unavailable.</li> <li>3. Develop methods to compare the robustness of network screening methods using AADT-based and non-AADT-based models.</li> <li>4. Provide recommendations on adopting AADT-based and non-AADT-based models in ranking signalized intersections and potentially expanding them to unsignalized intersections for safety improvements.</li> </ol> <p>As a first step in achieving the research goal and objectives, the research team will conduct a comprehensive literature review focusing on the AADT-based and non-AADT-based models to</p>		

<sup>1</sup> [Florida Traffic Safety Dashboard - S4Analytics](#)

<sup>2</sup> FDOT, *FDOT 2021 Strategic Highway Safety Plan (SHSP)*, 2021; Available from: [https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/safety/shsp-2021/shsp\\_mar21.pdf](https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/safety/shsp-2021/shsp_mar21.pdf)

	<p>quantify the safety performance of signalized intersections. Once the models and data variables are identified, the team will collect and process the required data variables. The AADT-based and non-AADT-based models will be developed for different types of signalized intersections and context classification. The robustness of these models will then be evaluated based on model accuracy and predictive power. The analysis results will be used to develop recommendations on adopting AADT-based and non-AADT-based models in ranking signalized intersections for safety improvements. The recommendations will potentially be expanded to unsignalized intersections as well. Finally, the applicability of these models and the recommendations will be demonstrated using a case study based on a subset of signalized and unsignalized intersections in Florida.</p> <p>Note that this research effort is directly related to the <i>Safety</i> pillar of the FDOT Compass. This project will assist FDOT in improving safety at intersections. The study results will help perform network screening to accurately estimate the potential for safety improvement of intersections, with the sole aim of reducing the frequency and severity of intersection crashes in Florida.</p>		
<b>Impact</b>	<p>FDOT has been unable to perform network screening on the entire network of signalized intersections due to missing AADT data on minor roads. This research will address this issue by providing recommendations on ranking signalized intersections for safety improvements based on the availability of minor road AADT data. In summary, this research will ensure that all the signalized intersections in Florida are assessed based on their potential for safety improvement.</p>		
<b>Affected Offices/Districts</b>	State Traffic Engineering and Operations Office; State Safety Office		
<b>Existing Work</b>	<p>Based on a quick search of the TRB's RiP database and the NCHRP projects database, there were no recently completed or ongoing research projects that specifically focus on addressing the issue of missing minor road AADTs in network screening of signalized intersections. However, there is a significant interest on this topic as is evident from several journal publications that focused on network screening using surrogate measures<sup>3</sup> and at locations with incomplete AADT data<sup>4</sup>.</p>		
<b>Keywords Used In Existing Work Search (Cannot leave blank)</b>	<p>"Intersection + network screening": No results  "Signalized intersections + AADT": 2 results. None of the results are relevant to this research topic.  "Signalized intersections + network screening": 2 results. None of the results are relevant to this research topic.  "Network screening": 13 results. A couple of projects focused on network screening on low-volume roads but none of them specifically focused on missing minor road AADTs.</p>		
<b>Related Contracts (Give contract numbers)</b>	None.		
<b>Funding Request</b>	\$180,000	<b>Anticipated Duration</b>	18 months
<b>Project Manager</b>	Dibakar Saha, PhD, PE, PTOE, RSP <sub>21</sub>	<b>Contracting Method</b>	Direct contract with Florida International University (PI: Dr. Alluri)
<b>Equipment</b>	N/A		
<b>Urgency</b>	1	<p>There are over 16,000 signalized intersections in Florida. Most of these intersections are not ranked based on the potential for safety improvement because they don't have AADT data on minor roads. This research helps fill this gap and ensures that all the signalized intersections in Florida are analyzed.</p>	
<b>Implementability</b>	1	<p>The research results will be readily implementable. The Department could use the results as they become available.</p>	

<sup>3</sup> Stipancic, J., Miranda-Moreno, L., Saunier, N., & Labbe, A. (2019). Network screening for large urban road networks: Using GPS data and surrogate measures to model crash frequency and severity. *Accident Analysis & Prevention*, 125, 290-301.

<sup>4</sup> Park, P. Y., & Sahaji, R. (2013). Safety network screening for municipalities with incomplete traffic volume data. *Accident Analysis & Prevention*, 50, 1062-1072.

**Project Benefits (Succinct, complete explanation)**

This research effort will assist the Department in accurately analyzing the safety performance of signalized intersections, especially when minor road AADT is unavailable.

<b>Project Benefits (Select all that apply and explain)</b>	<b>Quantifiable Benefits (units, dollars, etc...if applicable)</b>	<b>Methodology or Data Sources Used to Determine Quantifiable Benefits. If not applicable, please give justification of project benefits</b>
<input type="radio"/> Materials Enhancement		
<input type="radio"/> Financial Impact		
<input type="radio"/> Time Savings		
<input type="radio"/> <b>Lives Saved/ Injuries Prevented</b>		This research effort will assist the Department in assessing the safety performance of all signalized intersections in the state, resulting in a reduction in traffic fatalities and injuries.
<input type="radio"/> Other (Explain)		

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