

# Identifying Corridor-Level Safety Improvements for Urban and Suburban Arterials in Florida Within a Safe System Framework

John McCombs<sup>1</sup>, Haitham Al-Deek, Ph.D., P.E.<sup>2</sup>, Adrian Sandt, Ph.D.<sup>3</sup>, Nizam Uddin, Ph.D.<sup>4</sup>, and Grady Carrick, Ph.D.<sup>5</sup>

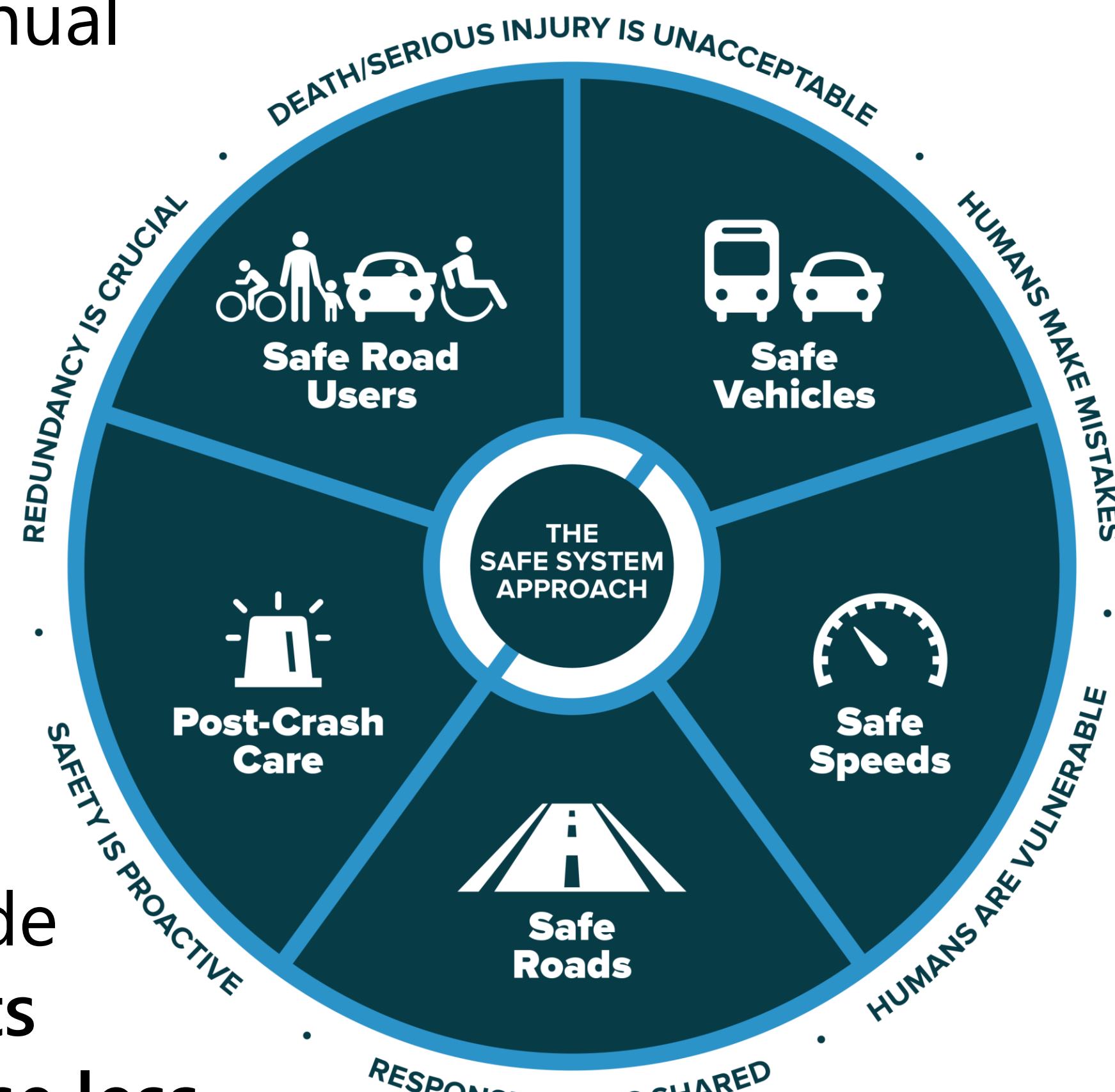
<sup>1</sup>Ph.D. Candidate, UCF Department of Civil, Environmental, and Construction Engineering (CECE)    <sup>2</sup>Professor of Engineering, UCF CECE    <sup>3</sup>Research Associate, UCF CECE  
<sup>4</sup>Professor of Statistics, UCF Department of Statistics & Data Science    <sup>5</sup>Principal, Enforcement Engineering, Inc.



UNIVERSITY OF  
CENTRAL FLORIDA

## RESEARCH BACKGROUND

- Increased dangerous driving behaviors in recent years have led to **more fatal and serious injury (FSI) crashes**.
- Transportation agencies are focusing on **proactively preventing FSI crashes** using the **Safe System** approach.
- The Highway Safety Manual (HSM) provides many quantitative methods to assess safety.
- HSM methods are...
  - Site-level** (segment and intersection).
  - Data-intensive**.
  - Not developed for **FSI crashes**.
- Analyzing **corridors made of consecutive segments and intersections** can use **less data** and look at roadways **more holistically** as opposed to a collection of individual sites.
- Focusing on **urban and suburban arterials** helps to **reduce the most FSI crashes** via safety improvements.



## RESEARCH GOAL

- Use a **corridor approach** in a Safe System context to **identify proactive safety improvements** which can reduce FSI crashes.
- Safety improvements are identified using **regression modeling and sister corridor comparisons**.

## METHODOLOGY

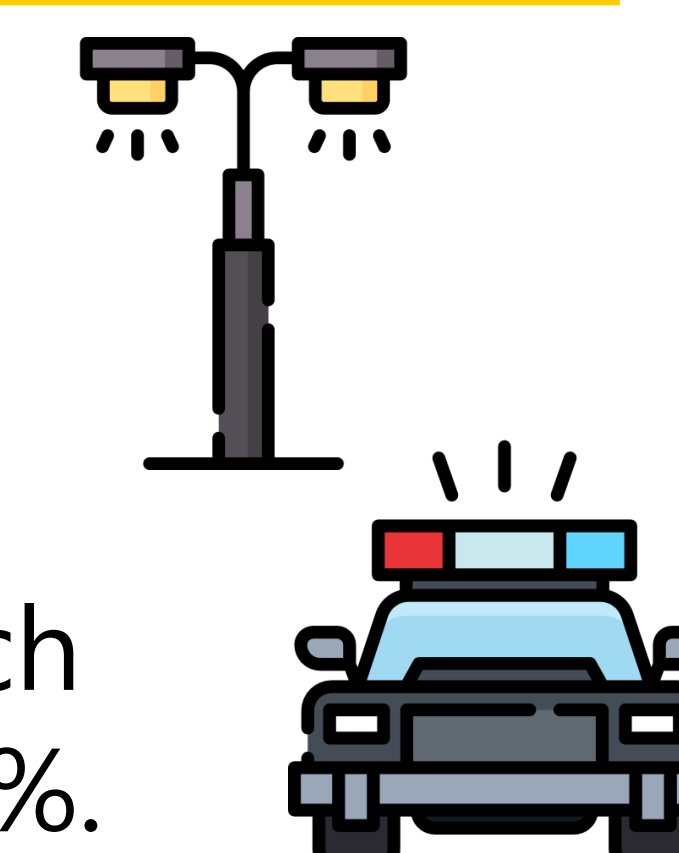
- Identify corridors.**
  - Primary defining features: context classification, lane count.
  - Additional criteria: contain at least one signalized intersection, at least ½ mile long, at least four years of traffic volume data.
- Collect data.** 10,103 FSI crashes and 9,960 non-crash citations for unsafe driving behaviors from 2017-2021, 33 roadway elements.
- Build a regression model.** Predict corridor mean FSI (MFSI) crash frequency, estimate safety improvement impacts.
- Calculate expected crash frequency.** Combine observed and predicted crash frequencies using the empirical Bayes method.
- Analyze sister corridors.** Corridors with similar designs but different expected crash frequencies.

## MODEL RESULTS

- Model overdispersion parameter:**  $k = 0.45$ .
  - Lower value than similar segment models from the HSM.
- Mean absolute error: 0.70 FSI crashes/year.
- Corridors with greater traffic volumes, higher speed limits, greater intersection densities, larger intersections, and bus stops are predicted to have **more MFSI crashes**.
- Suburban corridors** are predicted to experience **59% more MFSI crashes** than urban corridors.

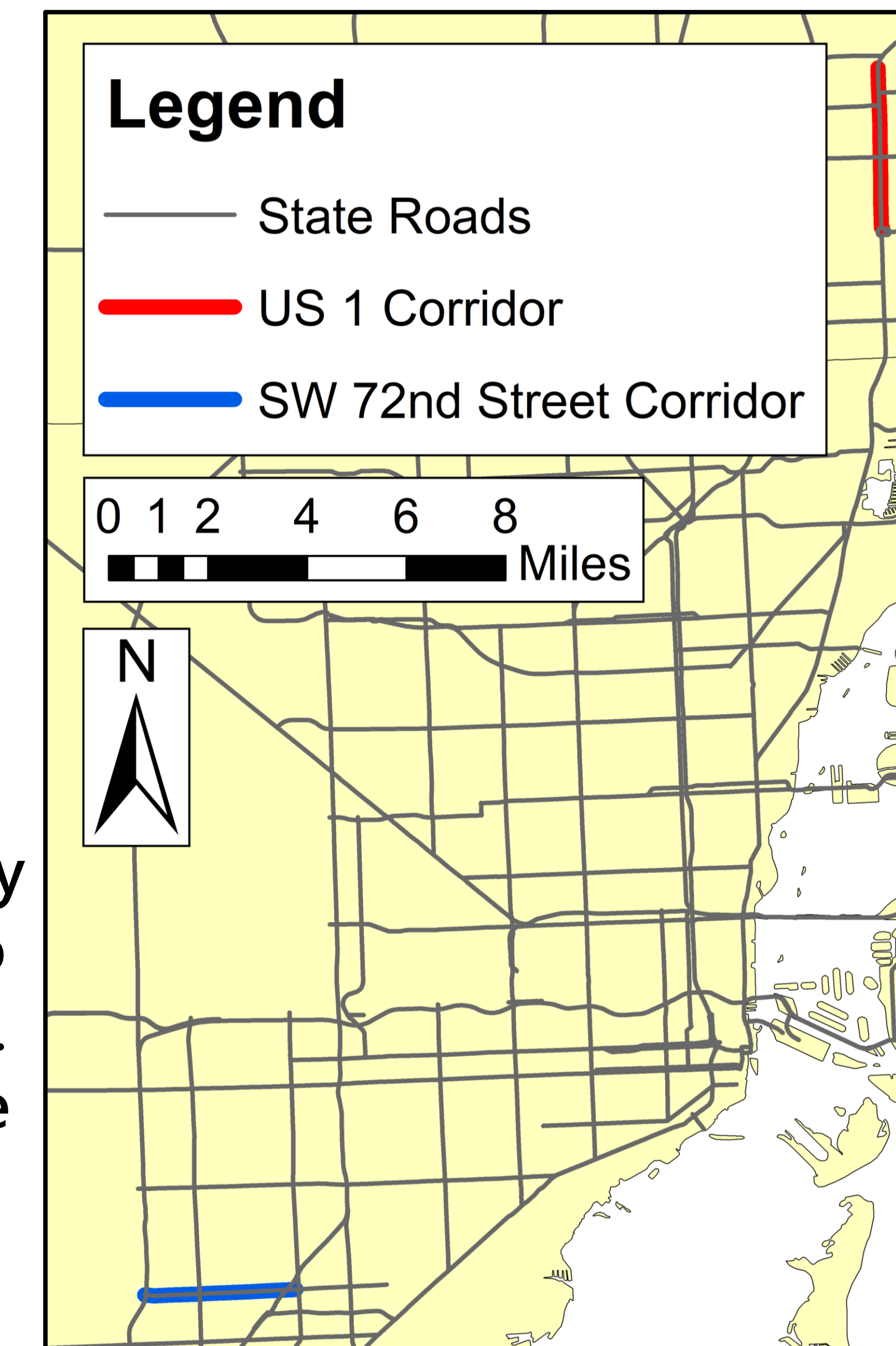
## POTENTIAL SAFETY IMPROVEMENTS

- ✓ **Install or improve lighting.** Corridors without lighting are predicted to experience 2.79x more MFSI crashes than lit corridors.
- ✓ **Increase proactive law enforcement patrols.** One-unit increase in the citation rate for unsafe driving behaviors, such as careless driving, predicted to decrease MFSI crashes by 2%.



## SISTER CORRIDORS

- Two urban four-lane corridors in South Florida.
  - Corridor A:** 8.4 FSI crashes/year.
  - Corridor B:** 3.2 FSI crashes/year.
- Corridor A had 2.5x more FSI pedestrian and bicyclist crashes than Corridor B.
  - Several crash reports noted **reduced visibility** in Corridor A due to **no lighting being present**.
- Corridor A had 4 FSI angle crashes compared to 1 FSI angle crash in Corridor B.
  - Corridor A had much **higher intersection densities** compared to Corridor B.
  - Corridor A was **primarily undivided** while Corridor B was primary divided with a raised concrete separator.
- Improving lighting and adjusting access management in Corridor A could help to reduce FSI crashes.



## CONCLUSIONS

- A corridor approach can help agencies **holistically assess roadways** for safety improvements in a Safe System.
- Improving lighting and increasing proactive law enforcement patrols** in suburban corridors can help to reduce the most FSI crashes.