

# Appendix 3 - Crash Profile Memo



To: Colleen Hoesly, Greater Madison MPO  
From: Alta Planning + Design  
Date: August 2023  
Re: Task 2.2 Crash Profiles

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## Crash Profiles by Mode

Through an examination of crash characteristics and contextual factors, the most pertinent crash trends were identified for further analysis through “crash profiles.” Crash profiles highlight specific conditions that account for a large share of fatal and serious injury crashes in the Madison region.

The following sections describe the specific crash profiles identified by mode for the Madison region, summarized below in **Table 1**. For each profile, the associated crash and contextual factors are described, as well as the number of crashes that match the described circumstances. Crash severities are summarized at three levels:

- All crashes
- Injury/fatal (FI) crashes (excludes property damage only)
- Severe injury/fatal (KSI) Crashes (KABCO injury level K or A<sup>1</sup>)

FI crashes are tabulated to align with the previously completed high injury network analysis and KSI crashes are included to emphasize profiles with the highest number of the most severe crashes. **Table 2** shows the number of crashes by mode for each tabulation level.

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<sup>1</sup> More information on the KABCO injury code definitions can be found here:  
[https://safety.fhwa.dot.gov/hisp/spm/conversion\\_tbl/pdfs/kabco\\_ctable\\_by\\_state.pdf](https://safety.fhwa.dot.gov/hisp/spm/conversion_tbl/pdfs/kabco_ctable_by_state.pdf)

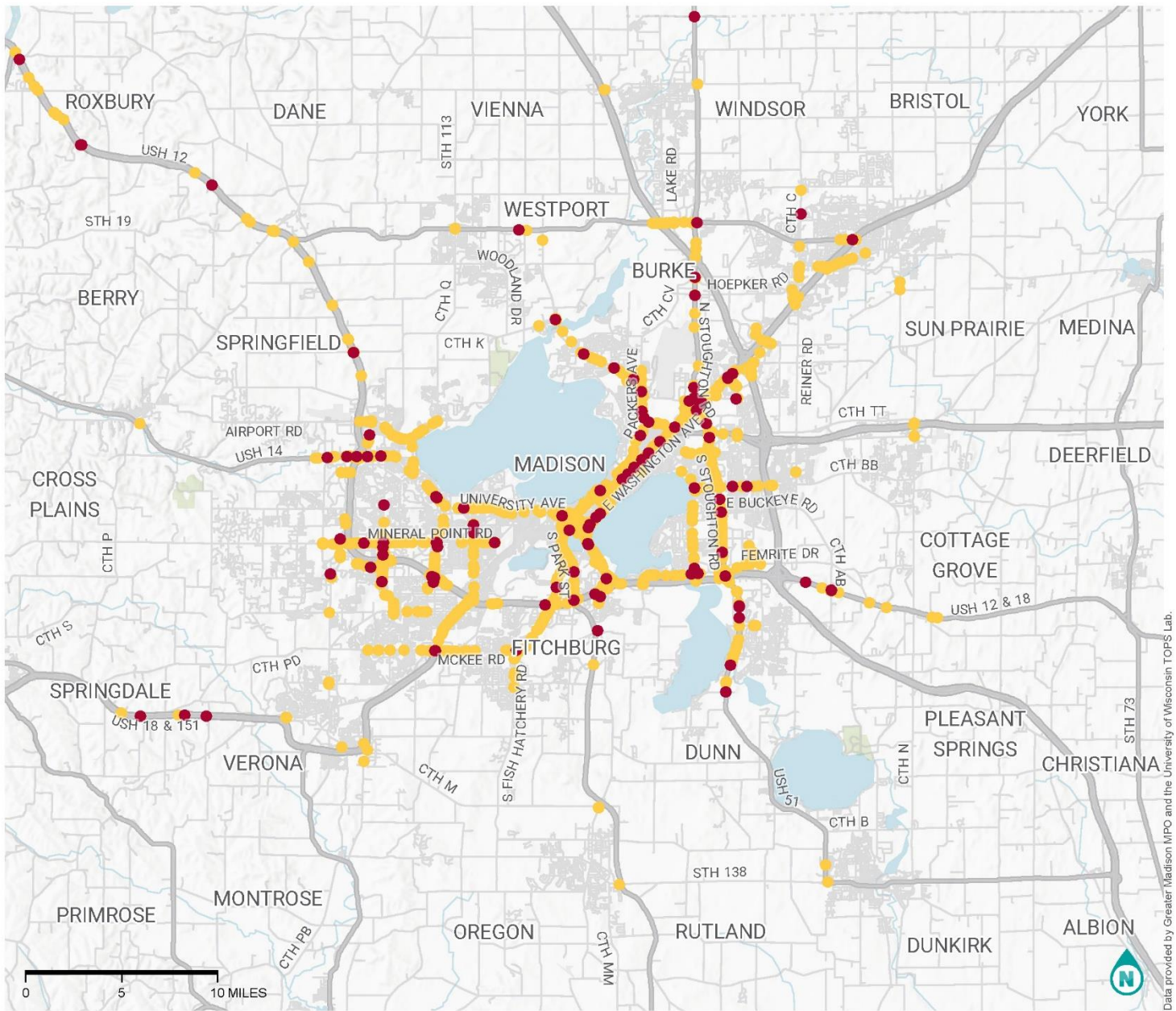
Table 1. Summary of Crash Profiles

Profile Name	Mode	Number of FI Crashes	% of Modal FI Crashes	Number of KSI Crashes	% of Modal KSI Crashes
<b>Vehicles</b>					
Multi-Lane Arterials	Vehicle	2,049	32%	121	27%
Turning Vehicles at Signalized Intersections	Vehicle	775	12%	47	11%
Roadway Departure in Rural Areas	Vehicle	293	5%	53	12%
<b>Bicyclists</b>					
Signalized Intersections	Bicycle	76	18%	8	16%
Uncontrolled Intersections	Bicycle	25	6%	8	16%
Roads Without Bike Infrastructure	Bicycle	91	22%	12	25%
Multi-Lane Arterials	Bicycle	65	16%	12	24%
<b>Pedestrians</b>					
Commercial Areas	Pedestrian	136	35%	29	27%
Multi-Lane Arterials	Pedestrian	84	21%	31	29%
Pedestrian Hit & Run Crashes	Pedestrian	41	10%	16	17%
Unmarked Mid-Block Crossings	Pedestrian	66	17%	12	11%

Table 2. Summary of Crashes by Mode and Injury Severity

Mode	All Crashes	FI Crashes	% FI Crashes	KSI Crashes	% KSI Crashes
Vehicle	27,684	6,338	23%	447	2%
Bicycle	454	412	91%	49	11%
Pedestrian	416	391	94%	106	25%
All Modes	28,554	7,141	25%	602	2%

Crashes occur across the MPO region, with different collision profiles concentrated throughout. The following maps identify where crashes aligning with each crash profile occurred during the study period. Each map is accompanied by a table to highlight the number and type of crashes contributing to each profile. Crash profiles are organized by mode, starting with vehicle crashes.



Data provided by Greater Madison MPO and the University of Wisconsin TOPS Lab.

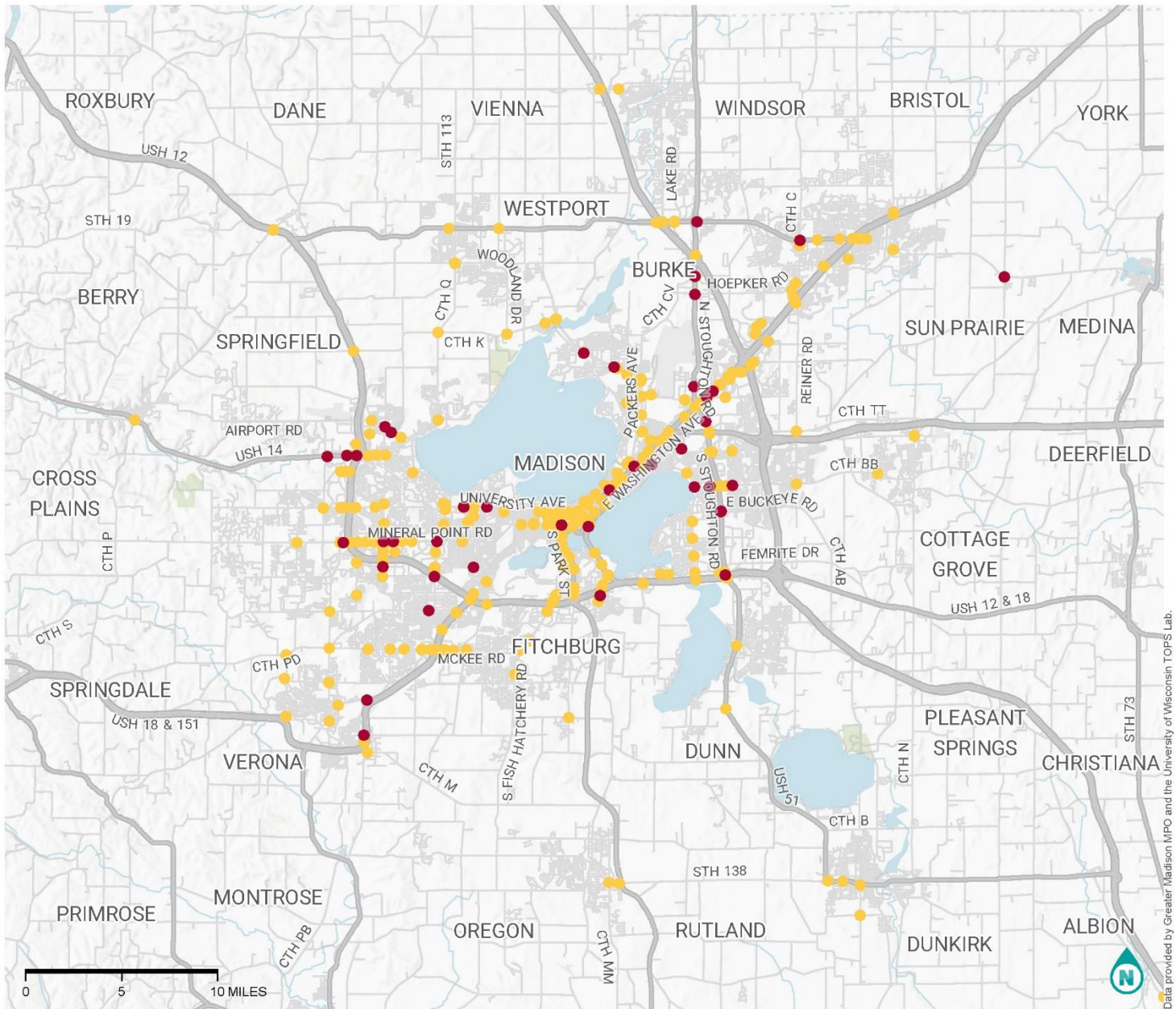
### VEHICLES ON MULTI-LANE ARTERIALS

This profile analyzes crashes that resulted in a severe or fatal injury on multi-lane arterials with posted speed limits of 30 mph or greater.

### CRASH SEVERITY

- Severe or Fatal
- Lesser Injury

All Crashes		FI Crashes		KSI Crashes		% of All KSI Crashes
# of Crashes	% of Modal Crashes	# of FI Crashes	% of Modal FI Crashes	# of KSI Crashes	% of Modal KSI Crashes	
8,083	29%	2,049	32%	121	27%	20%



Data provided by Greater Madison MPO and the University of Wisconsin TOPS Lab.

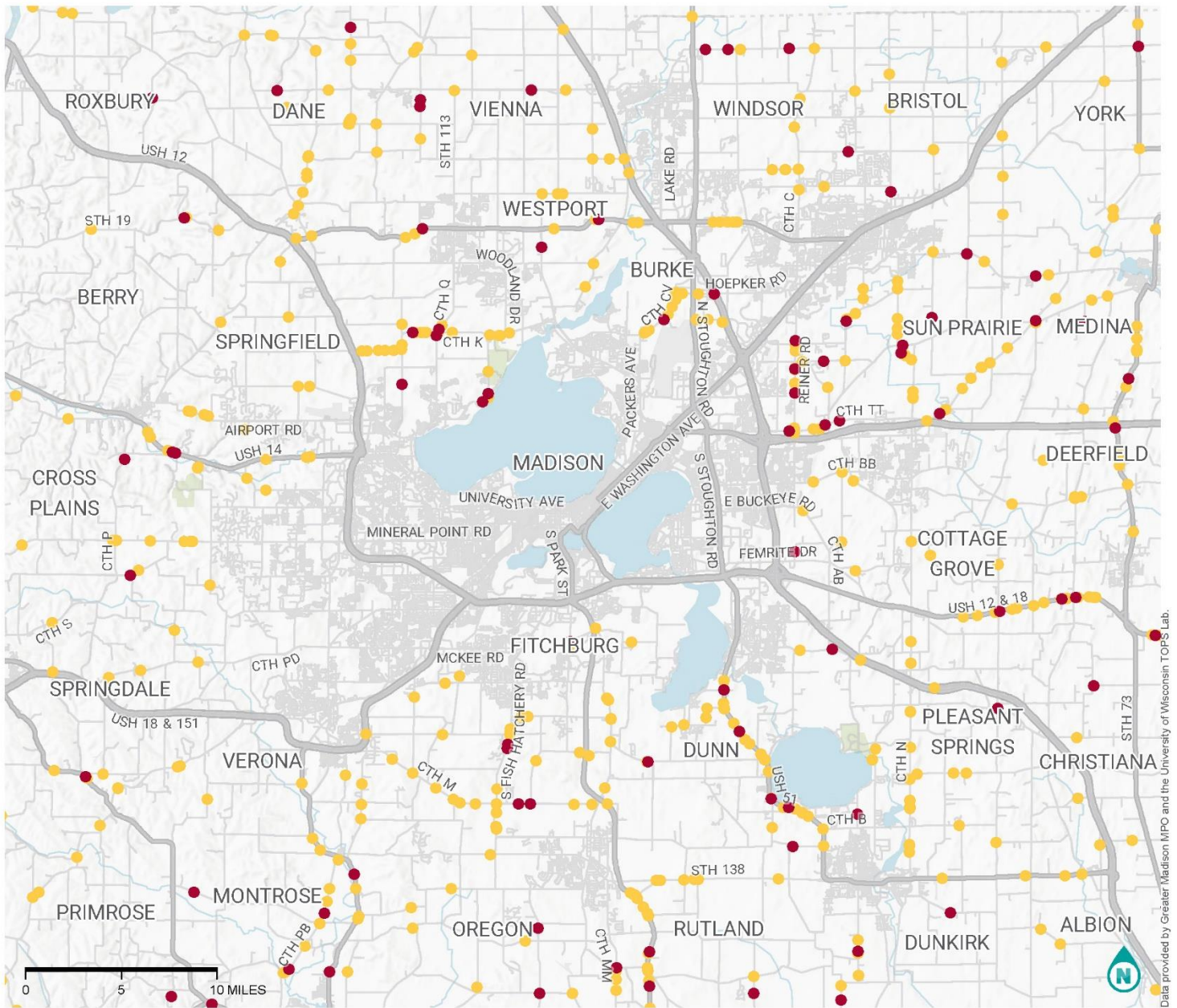
**TURNING VEHICLES AT SIGNALIZED INTERSECTION**

**CRASH SEVERITY**

- Severe or Fatal
- Lesser Injury

This profile analyzes crashes that resulted in an injury from a front-to-side vehicle crash at a signalized intersection.

All Crashes		FI Crashes		KSI Crashes		% of All KSI Crashes
# of Crashes	% of Modal Crashes	# of FI Crashes	% of Modal FI Crashes	# of KSI Crashes	% of Modal KSI Crashes	
1,918	7%	775	12%	47	11%	8%



Data provided by Greater Madison MPO and the University of Wisconsin TOPS Lab.

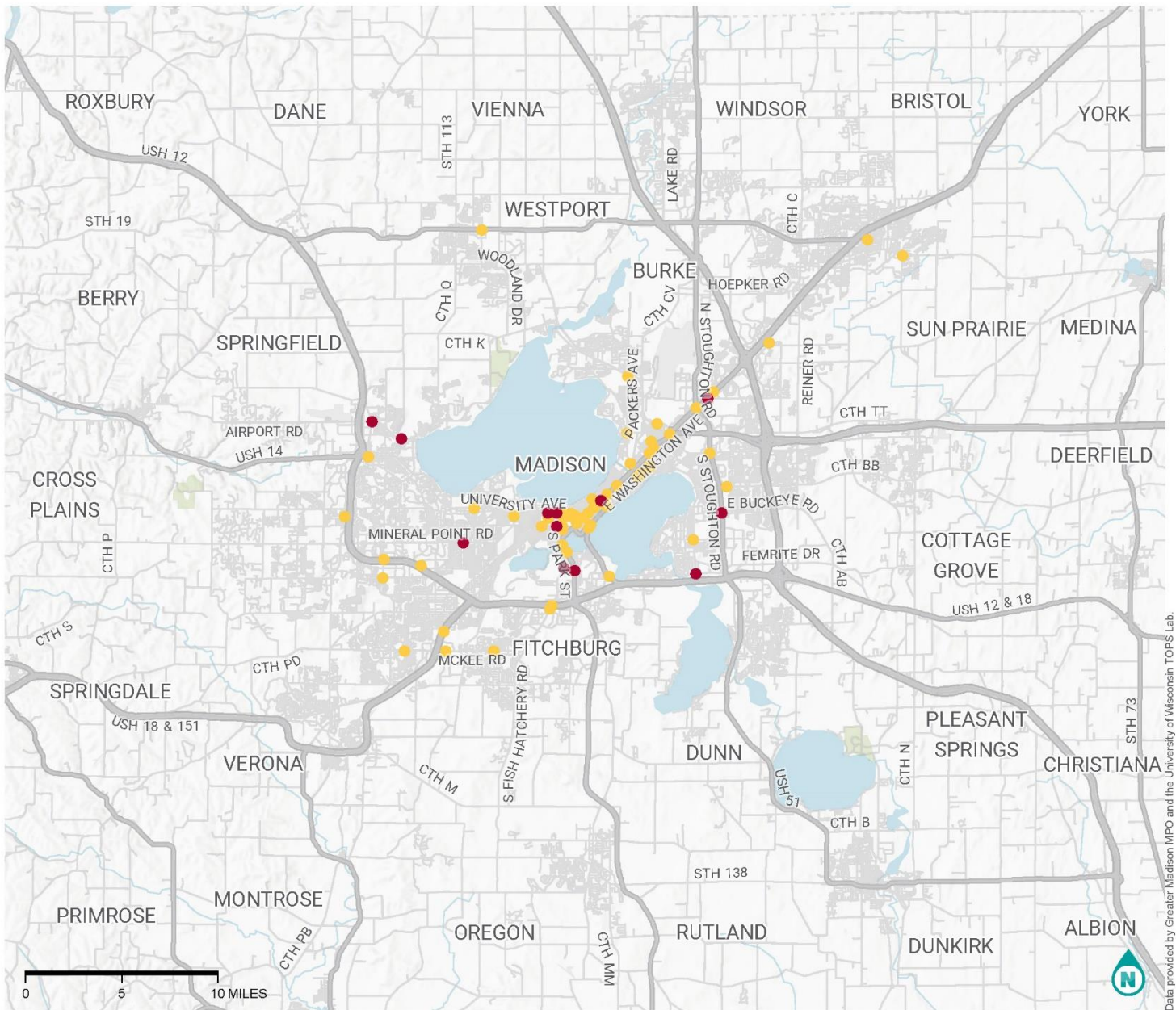
### RURAL ROADWAY VEHICLE DEPARTURE

This profile analyzes crashes that resulted in a severe or fatal injury. These non-junction crashes occurred on undivided rural roads with posted speed limits of at least 35 mph. Injuries resulted from the vehicle leaving the roadway and striking another object or otherwise losing control.

### CRASH SEVERITY

- Severe or Fatal
- Lesser Injury

All Crashes		FI Crashes		KSI Crashes		% of All KSI Crashes
# of Crashes	% of Modal Crashes	# of FI Crashes	% of Modal FI Crashes	# of KSI Crashes	% of Modal KSI Crashes	
1,224	4%	293	5%	53	12%	9%



**SIGNALIZED INTERSECTION BICYCLE CRASHES**

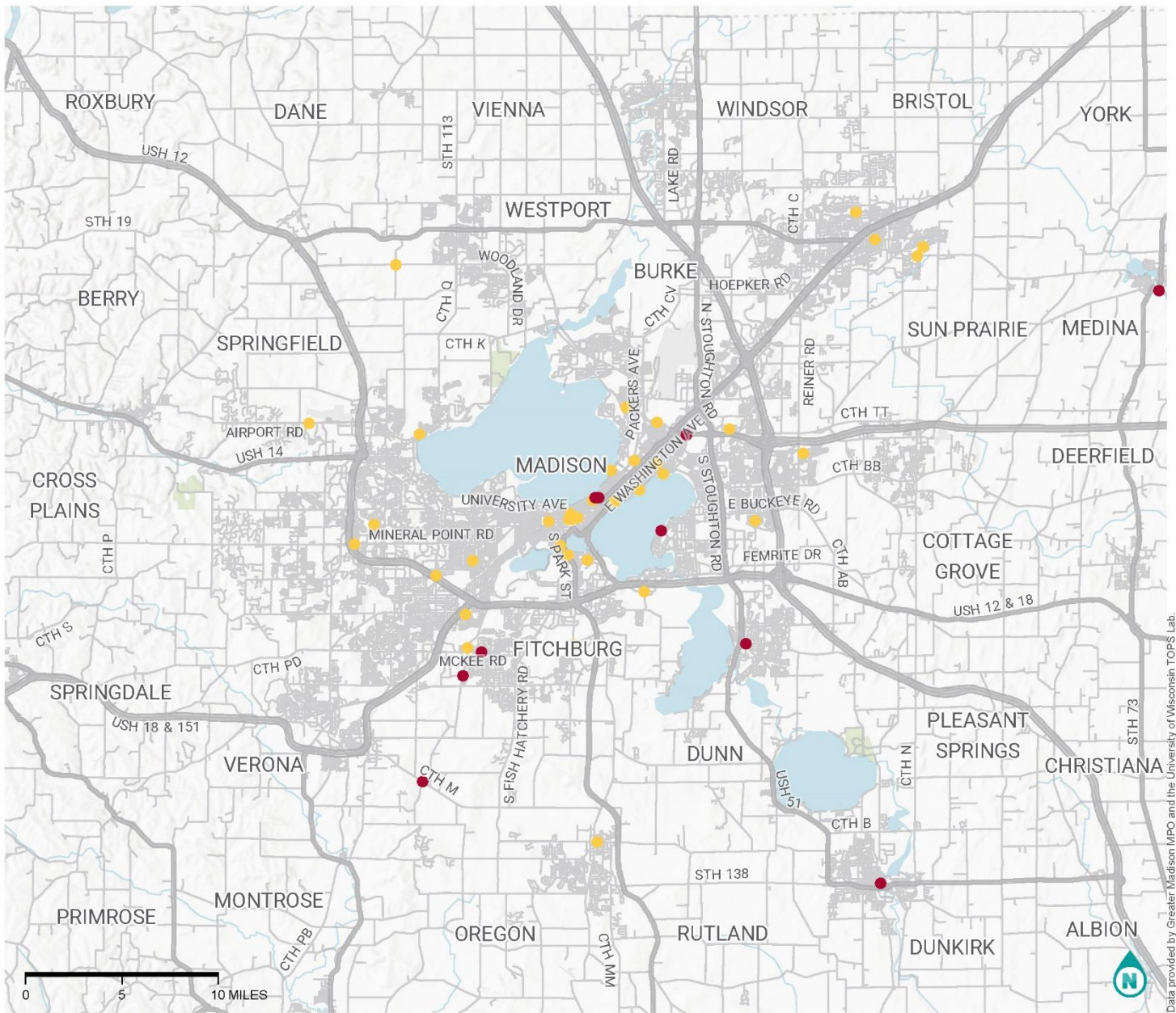
**CRASH SEVERITY**

- Severe or Fatal
- Lesser Injury

This profile analyzes severe or fatal bicycle crashes that occurred when a vehicle struck a bicyclist at a signalized intersection.

All Crashes		FI Crashes		KSI Crashes		% of All KSI Crashes
# of Crashes	% of Modal Crashes	# of FI Crashes	% of Modal FI Crashes	# of KSI Crashes	% of Modal KSI Crashes	
102	22%	93	23%	13	27%	2%

Data provided by Greater Madison MPO and the University of Wisconsin TOPS Lab.



Data provided by Greater Madison MPO and the University of Wisconsin TOPS Lab.

### UNCONTROLLED INTERSECTION BICYCLE CRASHES

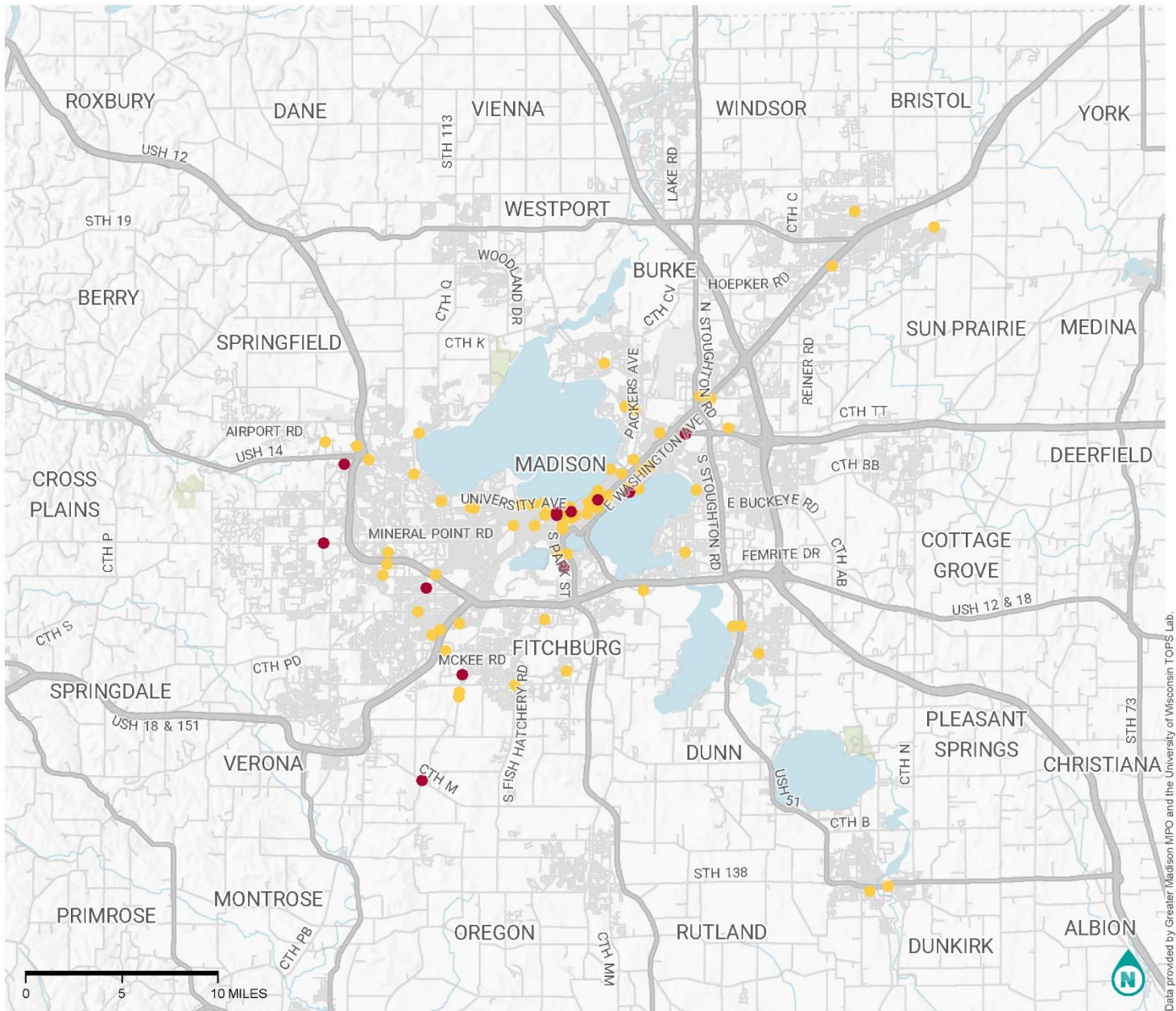
This profile analyzes severe or fatal bicycle crashes that occurred when a vehicle struck a bicyclist at an intersection with no traffic control devices.

### CRASH SEVERITY

- Severe or Fatal
- Lesser Injury

All Crashes		FI Crashes		KSI Crashes		% of All KSI Crashes
# of Crashes	% of Modal Crashes	# of FI Crashes	% of Modal FI Crashes	# of KSI Crashes	% of Modal KSI Crashes	
56	12%	51	12%	10	20%	2%





Data provided by Greater Madison MPO and the University of Wisconsin TOPS Lab.

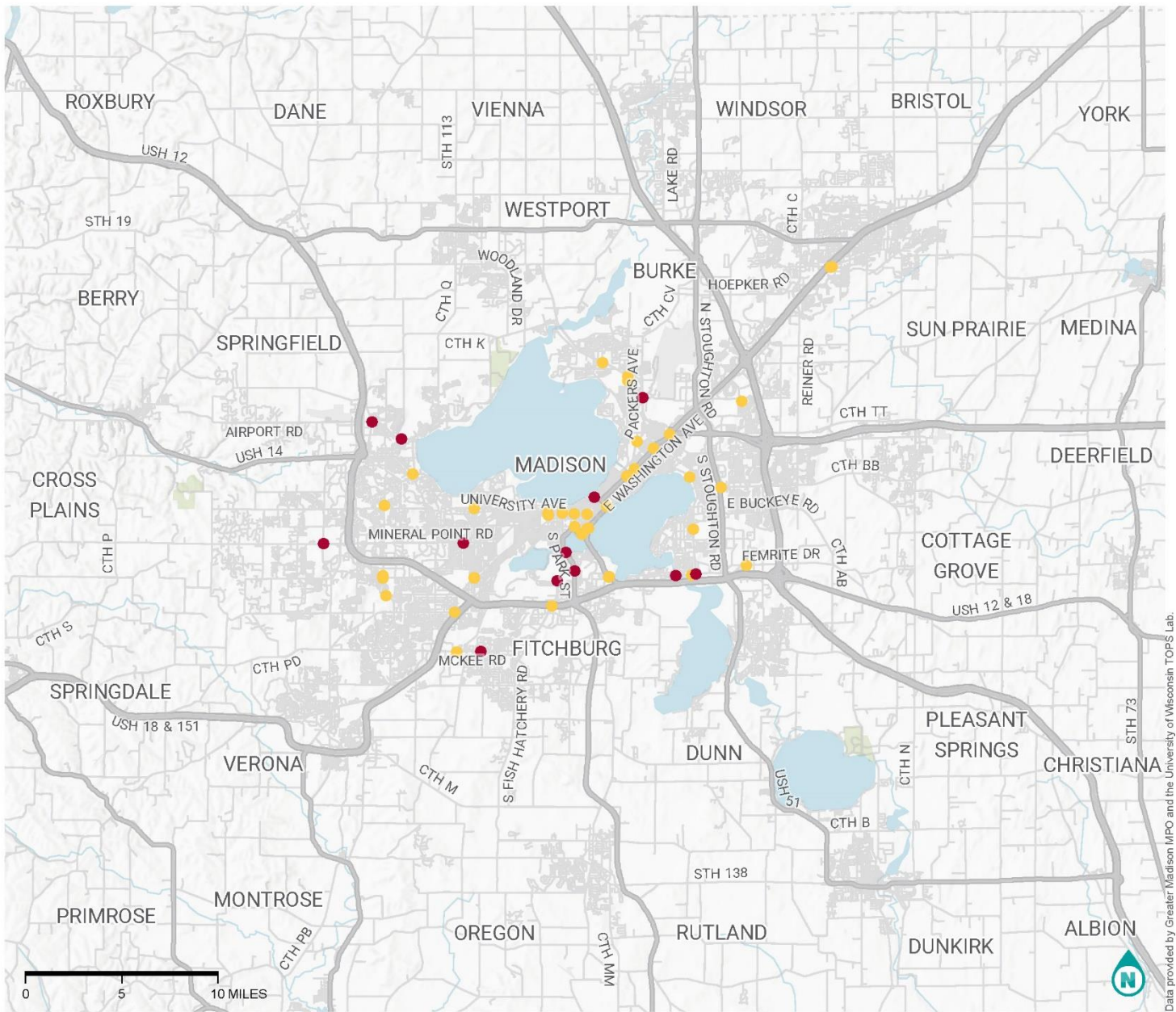
### BICYCLE CRASHES ON ROADS WITHOUT BIKE INFRASTRUCTURE

This profile analyzes bicycle crashes that occurred while the bicyclist was riding along an urban city street that had no bicycle infrastructure.

### CRASH SEVERITY

- Severe or Fatal
- Lesser Injury

All Crashes		FI Crashes		KSI Crashes		% of All KSI Crashes
# of Crashes	% of Modal Crashes	# of FI Crashes	% of Modal FI Crashes	# of KSI Crashes	% of Modal KSI Crashes	
100	22%	91	22%	12	25%	2%



**BICYCLE CRASHES ON MULTI-LANE ARTERIALS**

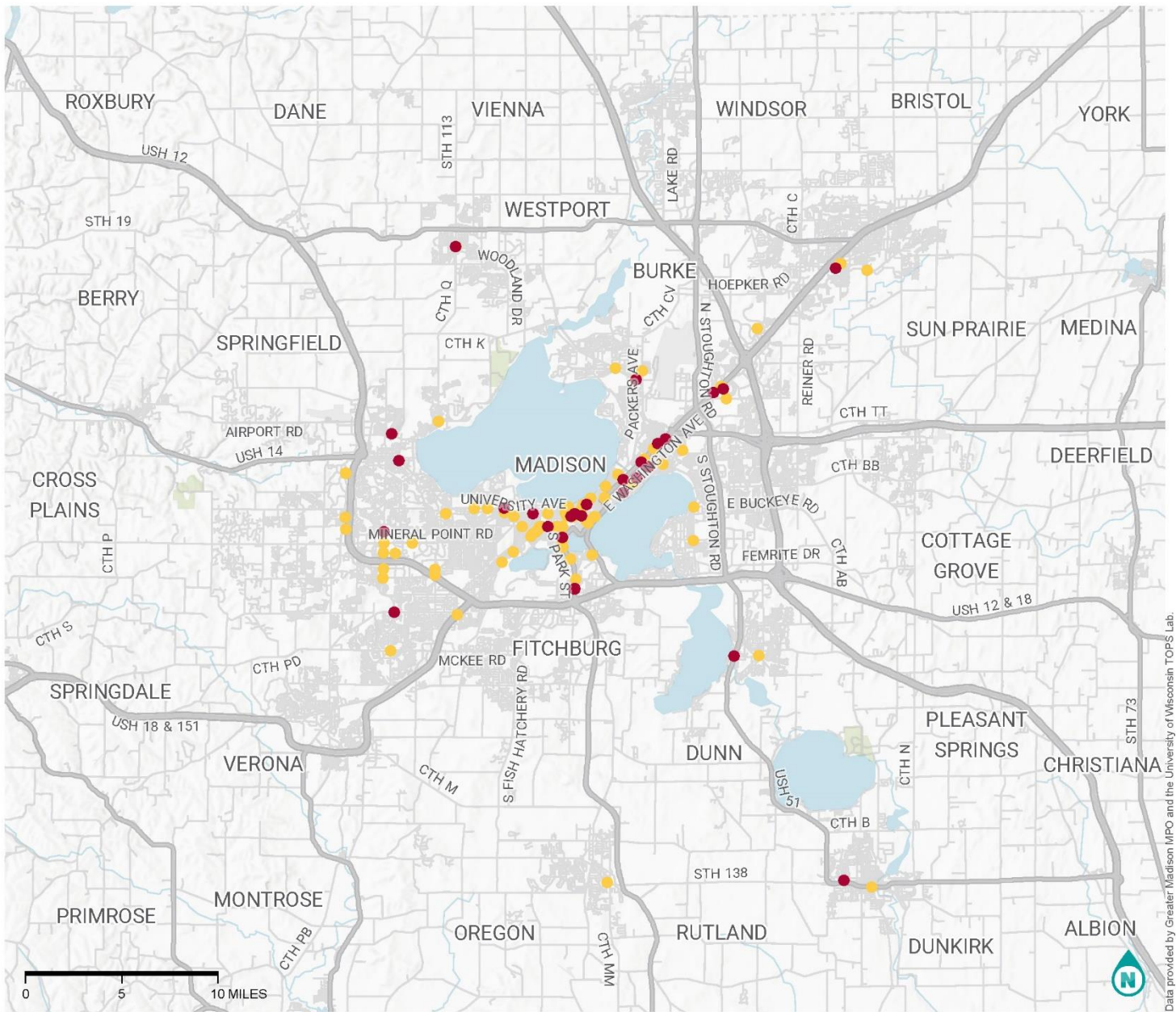
**CRASH SEVERITY**

- Severe or Fatal
- Lesser Injury

This profile analyzes severe or fatal bicycle crashes that occurred on multi-lane arterials with posted speed limits of at least 30 mph.

All Crashes		FI Crashes		KSI Crashes		% of All KSI Crashes
# of Crashes	% of Modal Crashes	# of FI Crashes	% of Modal FI Crashes	# of KSI Crashes	% of Modal KSI Crashes	
70	15%	65	16%	12	24%	2%

Data provided by Greater Madison MPO and the University of Wisconsin TOPS Lab.



Data provided by Greater Madison MPO and the University of Wisconsin TOPS Lab.

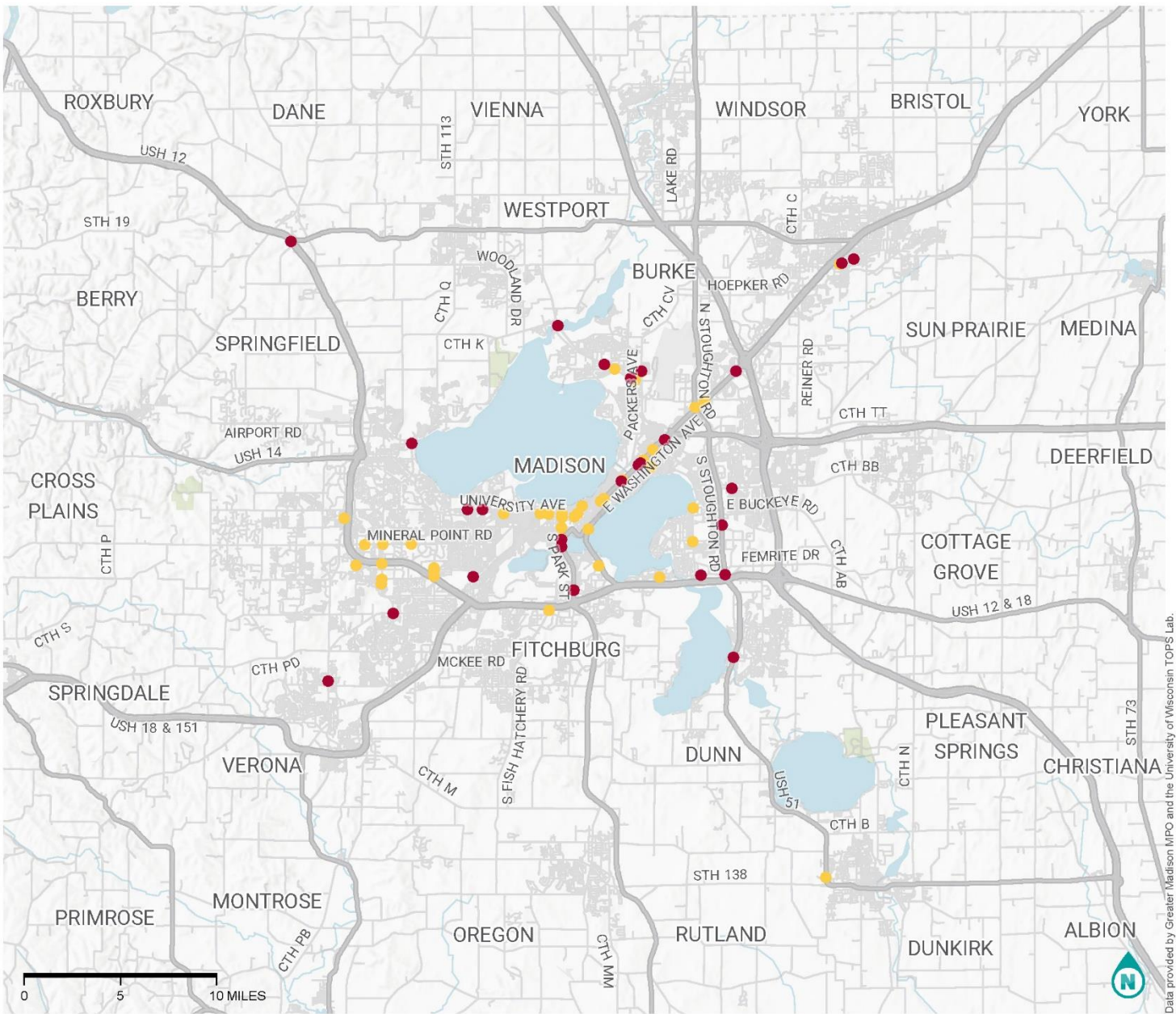
### PEDESTRIAN CRASHES IN COMMERCIAL AREAS

This profile analyzes pedestrian crashes that occurred while pedestrians were crossing the road in marked crosswalks in areas with commercial land uses.

### CRASH SEVERITY

- Severe or Fatal
- Lesser Injury

All Crashes		FI Crashes		KSI Crashes		% of All KSI Crashes
# of Crashes	% of Modal Crashes	# of FI Crashes	% of Modal FI Crashes	# of KSI Crashes	% of Modal KSI Crashes	
143	34%	136	35%	29	27%	5%



Data provided by Greater Madison MPO and the University of Wisconsin TOPS Lab.

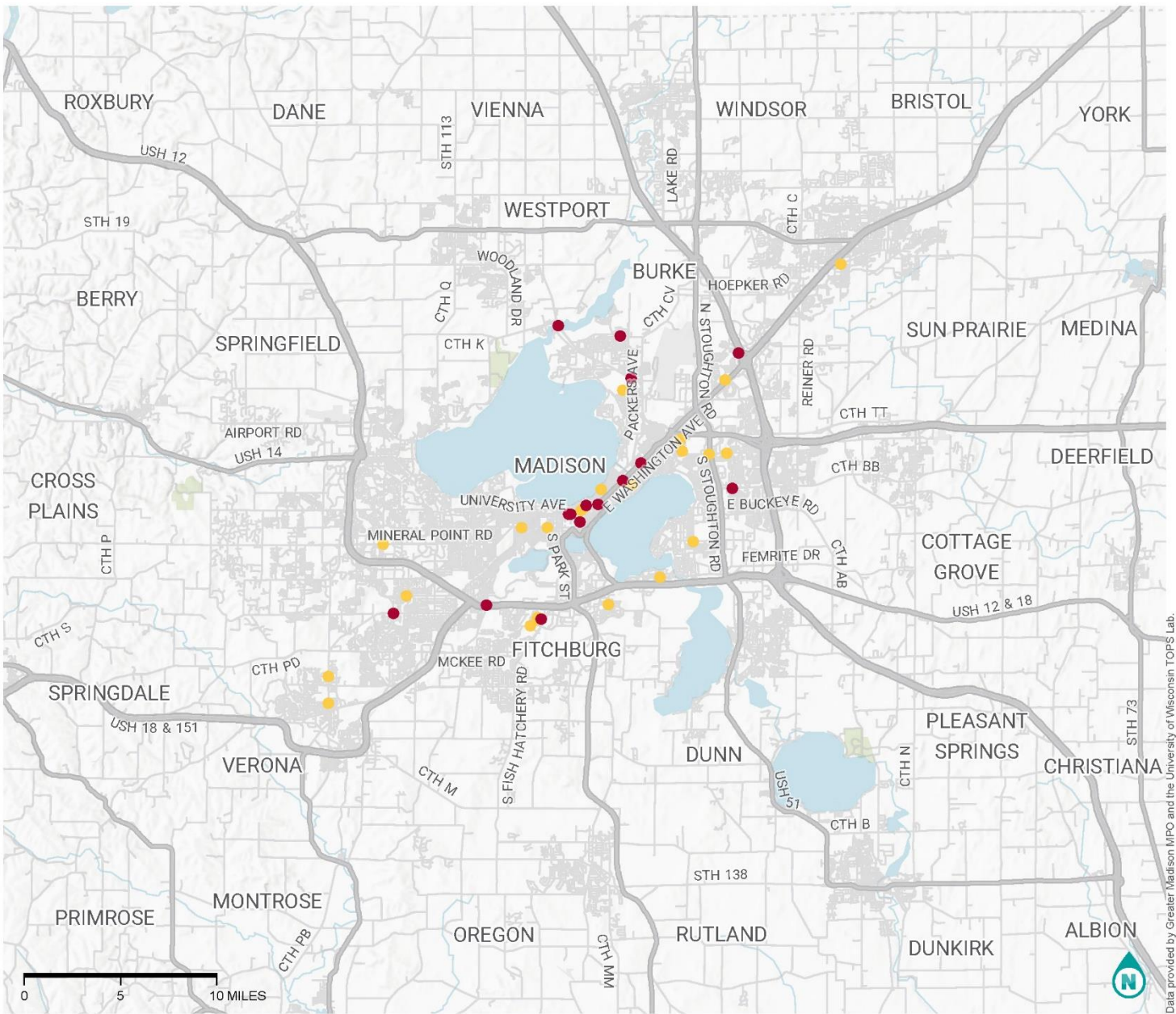
**PEDESTRIAN CRASHES ON MULTI-LANE ARTERIALS**

This profile analyzes severe or fatal pedestrian crashes on multi-lane arterials with posted speed limits of 30 mph or greater and annual average daily traffic of at least 6,000 vehicles.

**CRASH SEVERITY**

- Severe or Fatal
- Lesser Injury

All Crashes		FI Crashes		KSI Crashes		% of All KSI Crashes
# of Crashes	% of Modal Crashes	# of FI Crashes	% of Modal FI Crashes	# of KSI Crashes	% of Modal KSI Crashes	
88	21%	84	21%	31	29%	5%



Data provided by Greater Madison MPO and the University of Wisconsin TOPS Lab.

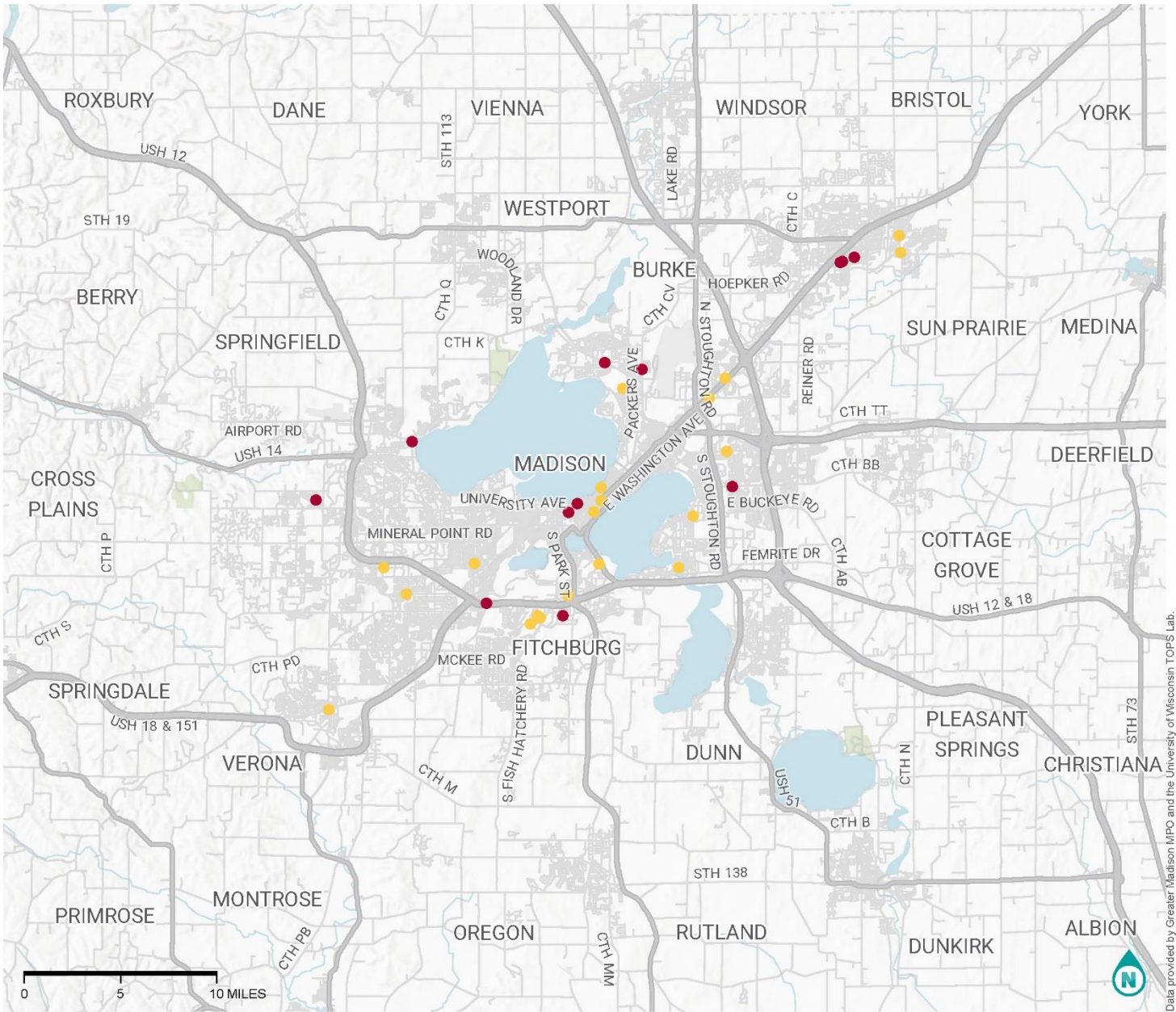
**PEDESTRIAN HIT & RUN CRASHES**

**CRASH SEVERITY**

- Severe or Fatal
- Lesser Injury

This profile analyzes severe or fatal hit and run pedestrian crashes that occur in urban settings at night.

All Crashes		FI Crashes		KSI Crashes		% of All KSI Crashes
# of Crashes	% of Modal Crashes	# of FI Crashes	% of Modal FI Crashes	# of KSI Crashes	% of Modal KSI Crashes	
43	10%	41	10%	16	17%	3%



Data provided by Greater Madison MPO and the University of Wisconsin TOPS Lab.

**PEDESTRIAN CRASHES WHILE CROSSING MID-BLOCK**

This profile analyzes severe or fatal pedestrian crashes in urban settings where the pedestrian is struck while crossing the road outside a marked crosswalk, not at an intersection.

**CRASH SEVERITY**

- Severe or Fatal
- Lesser Injury

All Crashes		FI Crashes		KSI Crashes		% of All KSI Crashes
# of Crashes	% of Modal Crashes	# of FI Crashes	% of Modal FI Crashes	# of KSI Crashes	% of Modal KSI Crashes	
35	8%	66	17%	12	11%	2%

## Speeding Behavior

Increased vehicle speeds result in more severe injury outcomes.<sup>2</sup> **Figure 1** shows the difference between modeled free-flow vehicle speeds and the posted speed limit around the county. Free-flow speed is based on the 66<sup>th</sup> percentile speed during off-peak hours, per INRIX GPS trace data developed by Replica.<sup>3</sup> Additionally, the map highlights roads where the free-flow speed is 30 mph or greater.

Vehicle free-flow speeds exceed posted speed limits by more in rural areas than they do in urban areas. Most rural roads outside of Madison show free-flow speeds of at least 15 mph greater than the posted speed limit. In general, speeding is lowest in downtown Madison and near the University of Wisconsin-Madison campus and increases in the suburban areas. Notable urban roads with prevalent speeding in the modeled data are S Whitney Way, Mineral Point Rd, S Segoe Rd, John Nolen Dr, and Cottage Grove Rd.

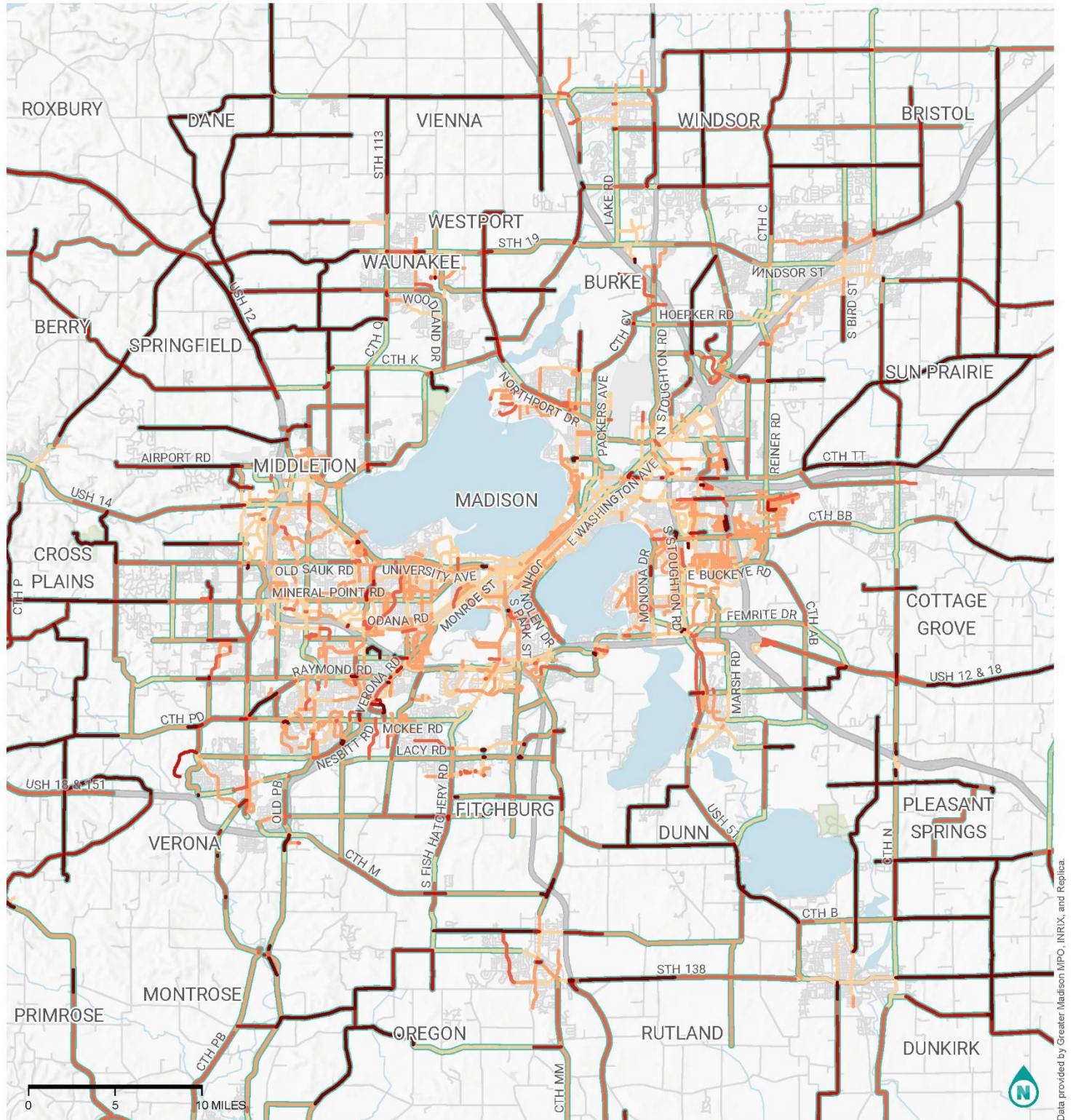
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<sup>2</sup> Read more about the link between vehicle speeds and injury severity here:

[https://safety.fhwa.dot.gov/speedmgt/ref\\_mats/fhwasa1304/Resources3/08%20-%20The%20Relation%20Between%20Speed%20and%20Crashes.pdf](https://safety.fhwa.dot.gov/speedmgt/ref_mats/fhwasa1304/Resources3/08%20-%20The%20Relation%20Between%20Speed%20and%20Crashes.pdf)

<sup>3</sup> [Replica](#) develops annual average free-flow traffic speeds per roadway network link, based on speeds during off-peak hours. Data used for this analysis was from 2022.

Figure 1. Modeled Free-Flow Speed



## MODELED FREE-FLOW SPEED

Free-flow speed is defined as the 66th percentile speed during off-peak hours, based on INRIX GPS traces. Freeways have been removed.

MADISON MPO  
SAFETY ACTION PLAN

## FREE-FLOW SPEEDING ABOVE POSTED SPEED LIMIT

- Greater than 15 mph
- 11 to 15 mph
- 6 to 10 mph
- 1 to 5 mph
- At or below
- No data
- Indicates free-flow speed of 30 mph or greater