DRIVE AWARE north texas

NCTCOG Roadway Safety Plan Peer Review

Roadway Safety Advisory Committee
7.22.2022 | Michael Misantonis and Kevin Kroll

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Need for a Roadway Safety Plan

- Metropolitan Planning Organizations (MPOs) like the North Central Texas Council of Governments (NCTCOG) are required to monitor and set targets for a specific set of performance measures

- Initial safety performance targets for 2018 were approved by Regional Transportation Council (RTC) in December 2017

- RTC Established Regional Safety Position:

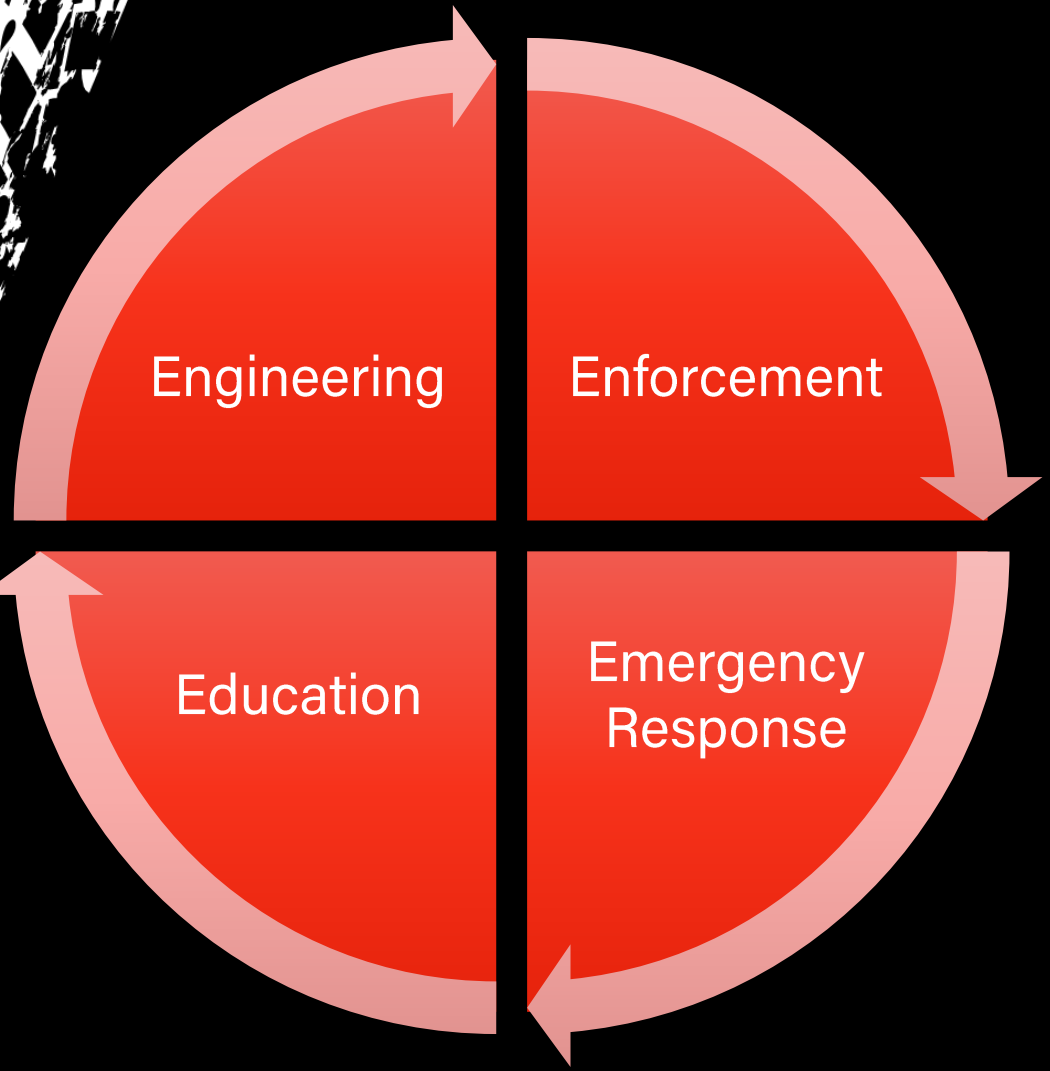
  "*Even one death on the transportation system is unacceptable. Staff will work with our partners to develop projects, programs, and policies that assist in eliminating serious injuries and fatalities across all modes of travel.*"

- Texas Transportation Commission adoption of Minute Order 115481

- Vision Zero

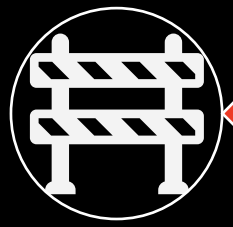
Local Roadway Plan Overview

- Local Roadway Safety Plans (LRSP) provide framework for identifying, analyzing, and prioritizing roadway safety improvements on local roads.
- Serves as a guide to identify focus crash types and risk factors, then select and prioritize systemic safety projects and countermeasures through the 4 E's of transportation.
- The overall goal is to eliminate fatal crashes by 2050.

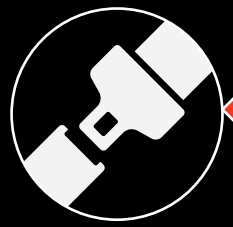


Roadway Safety Plan Goals

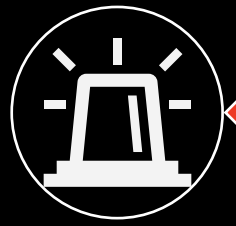
Eliminate all serious injury and fatal crashes across the region by 2050



Integrate safety into all roadway construction projects and consider the safety needs of all roadway users

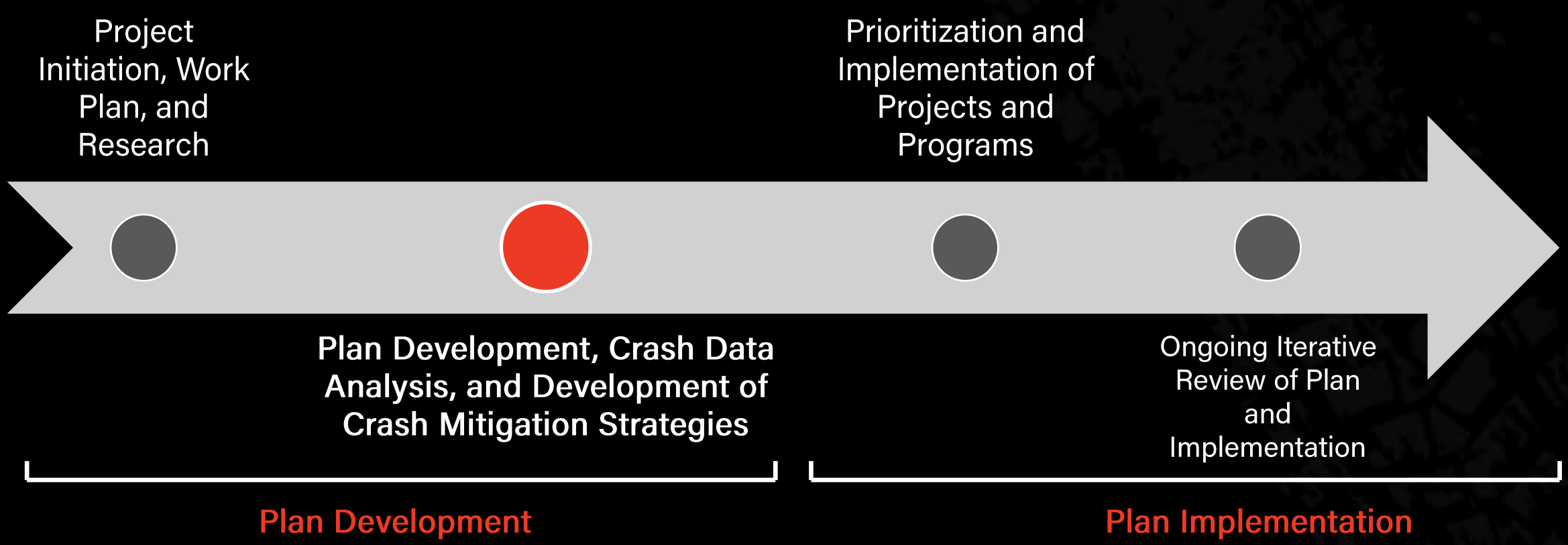


Develop behavioral and educational countermeasures that effectively combat dangerous driving behaviors



Work with Police to effectively enforce traffic rules and traffic management professionals to improve quick clearance strategies

NCTCOG Roadway Safety Plan Development Process



Research and Background

Other Cities/MPOs

- City of Boston
- New York Metropolitan Transportation Council
- Kansas City
- City of Philadelphia
- City of San Francisco
- Hillsboro County
- Etc.

Texas Statewide Plans

- Highway Safety Improvement Program (HSIP)
- Texas Strategic Highway Safety Plan (SHSP)
- A Plan for Saving Lives on Texas Roadways

NCTCOG Area

- Pedestrian Safety Action Plan (NCTCOG)
- Existing and/or upcoming City/District Vision Zero plans

Systemic Safety Approach

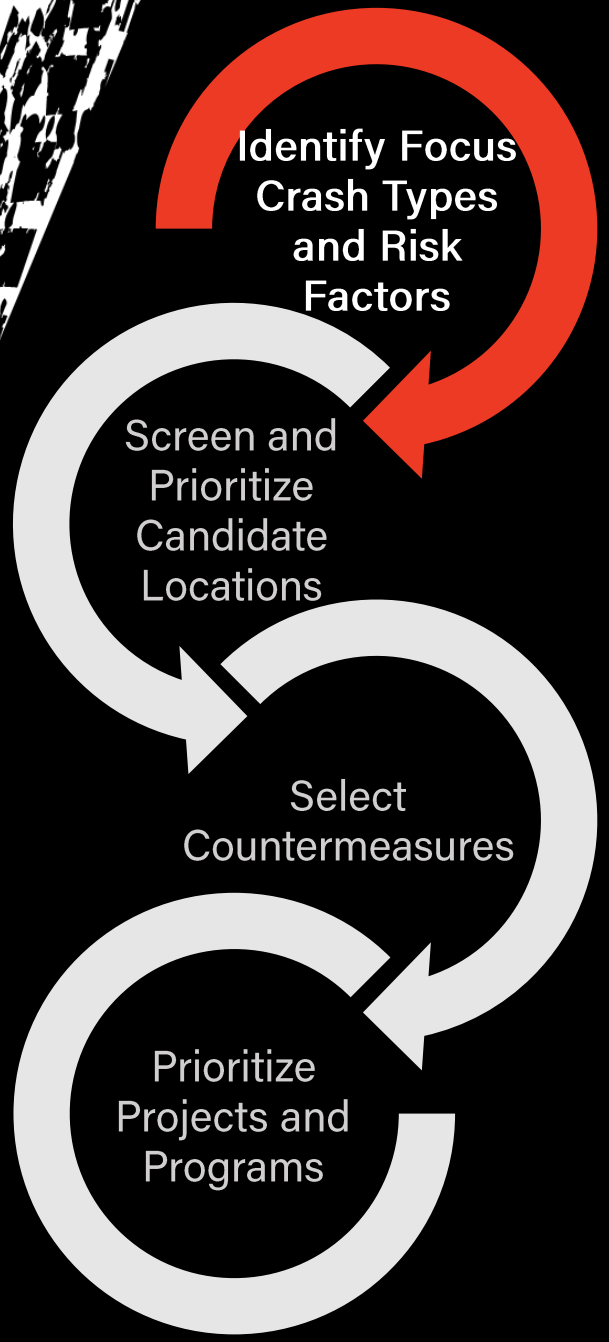
The Systemic Safety Analysis approach evaluates risk across an entire roadway system versus managing risk at specific locations based on crash history.

Helps identify what types of roadways and roadway characteristics produce fatal and serious injuries.

Main tasks within the first step of the Systemic Safety Analysis:

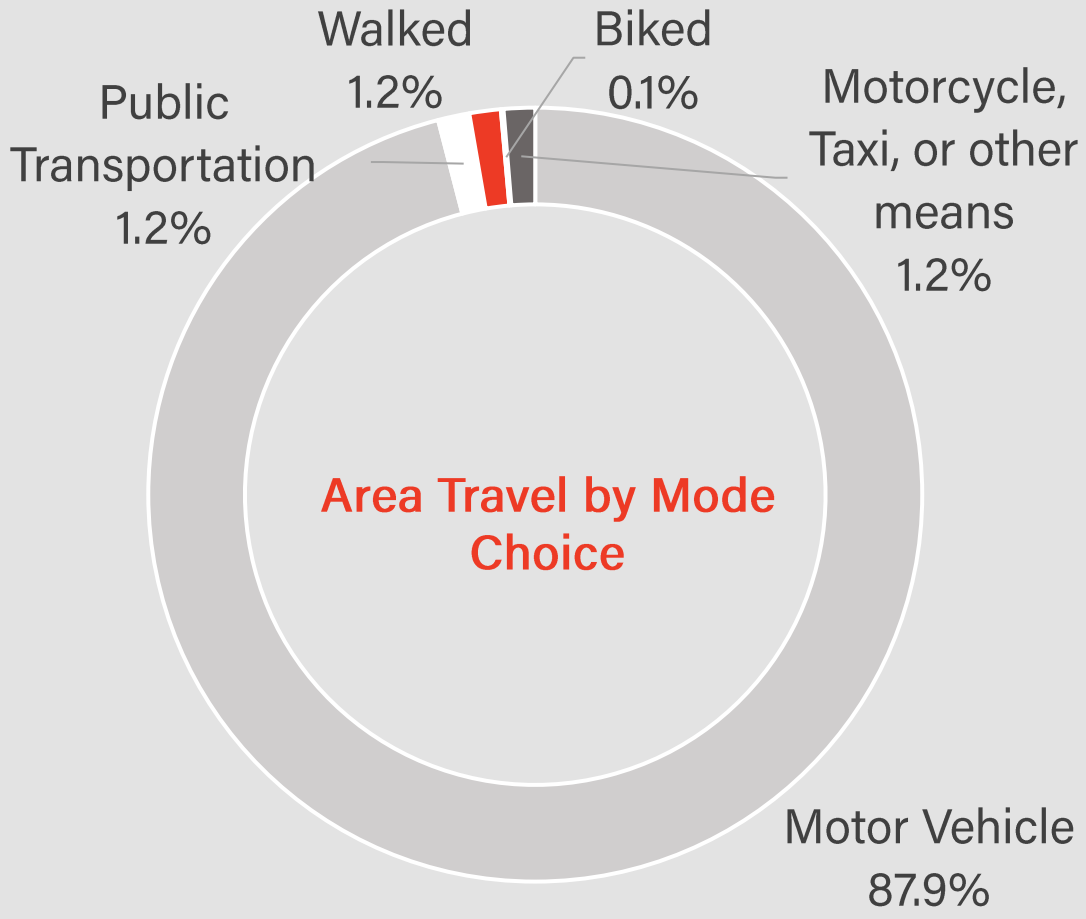
Identify Focus Crash Types and Risk Factors

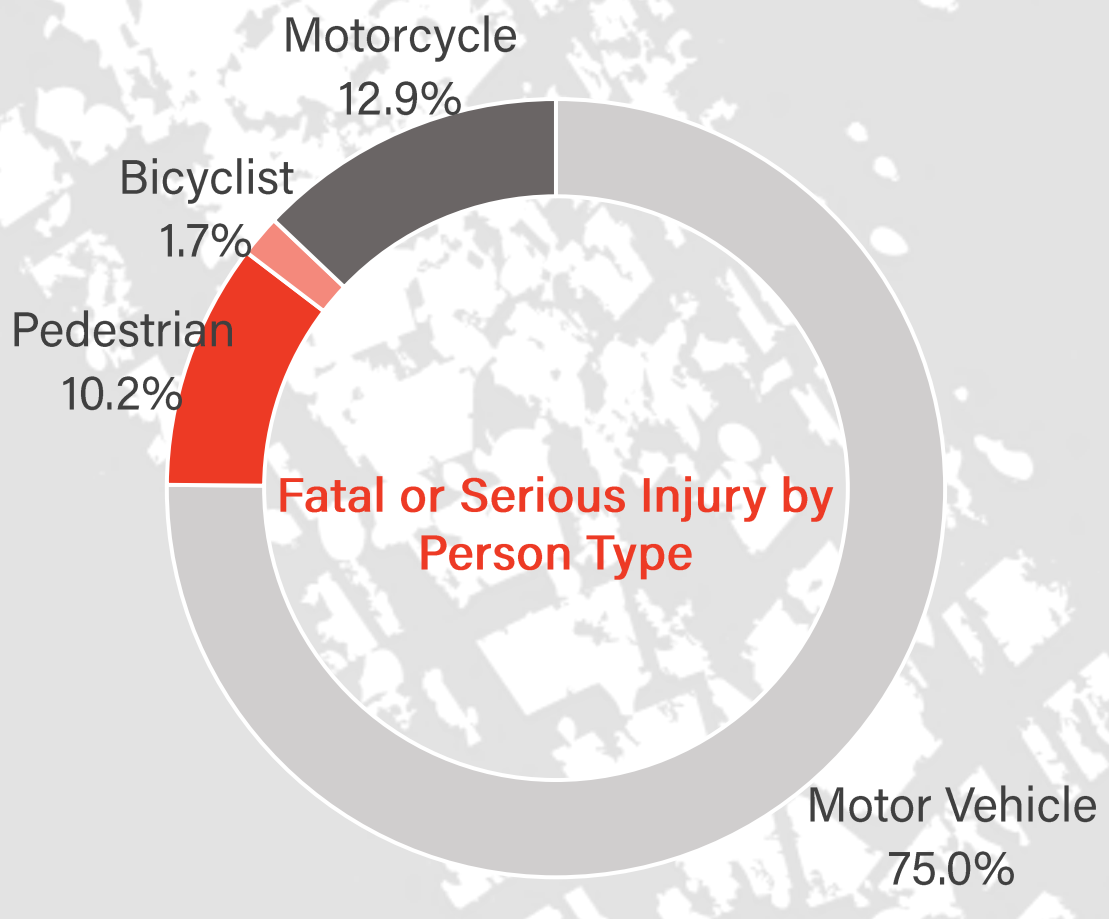
1. Identify Target Crash Types
2. Identify Focus Facility Types
3. Identify and Evaluate Risk (Roadway) Factors



Regional Safety Data Analysis (2016-2020)

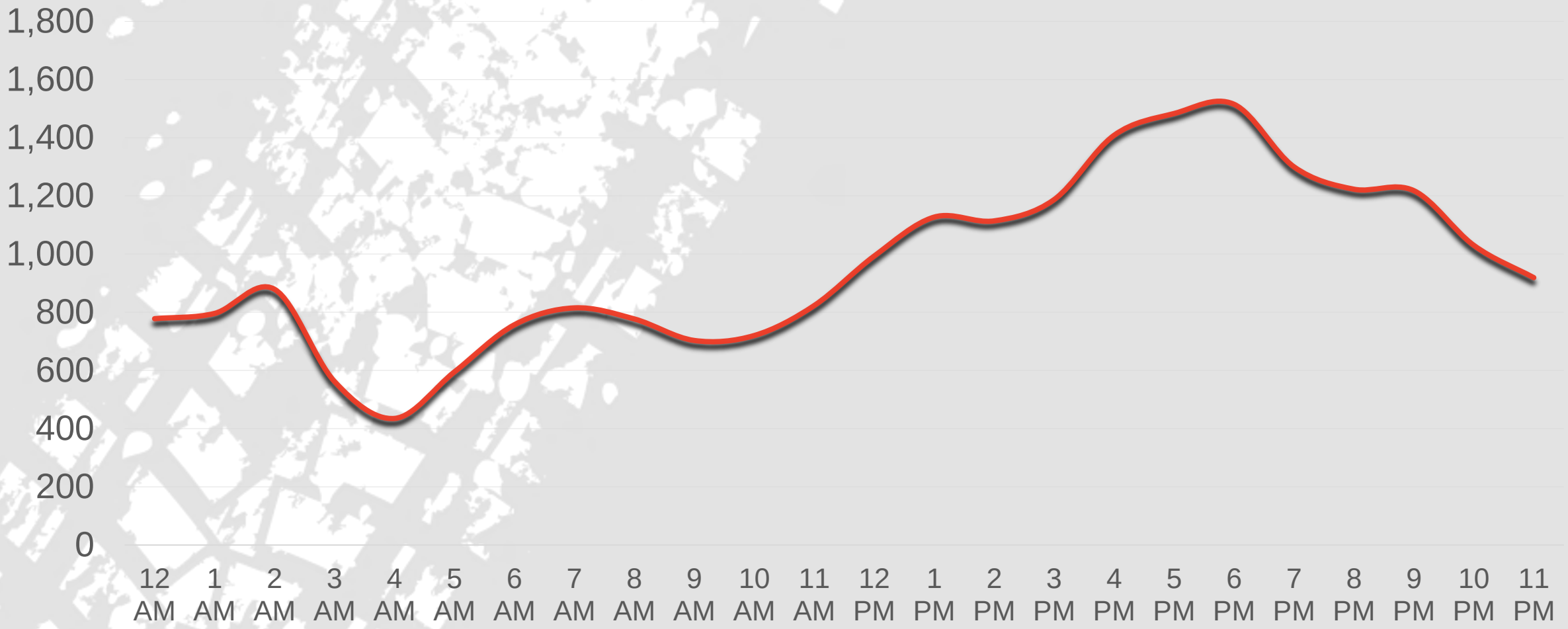
Fatal and Serious Injuries by Travel Mode



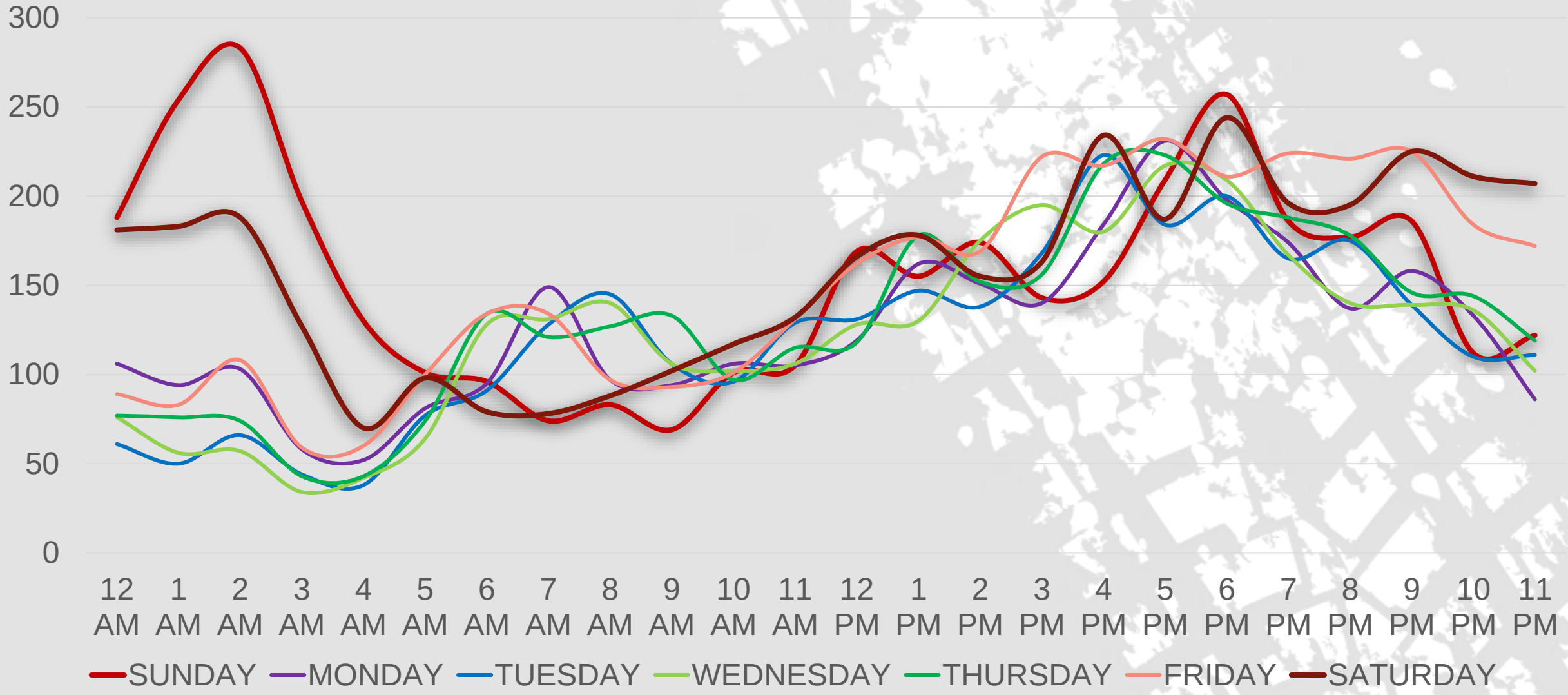


Dallas/Ft Worth Commuting Characteristics from ACS 2019
Crash Data for the 12-County Area, all roadways

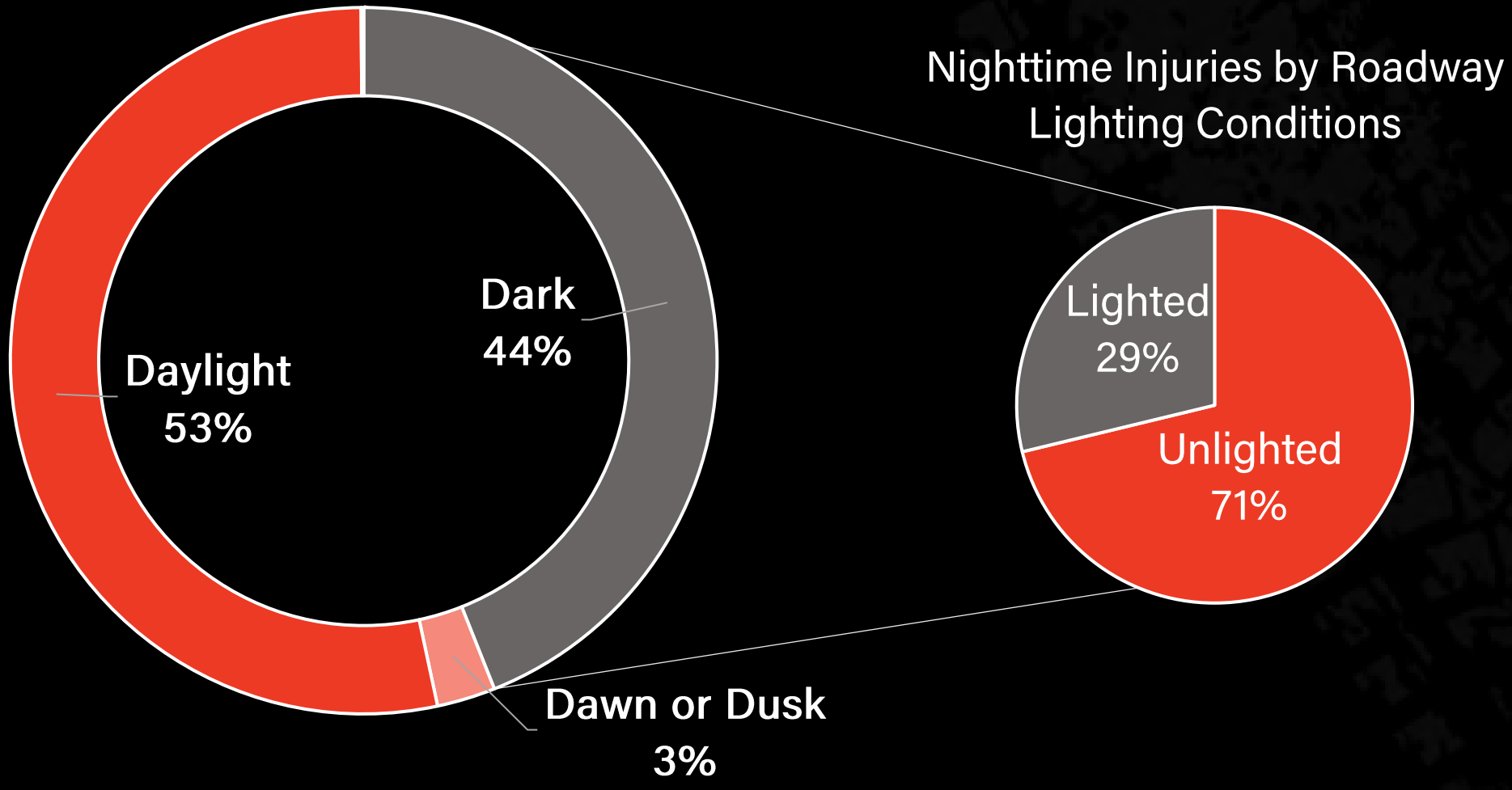
Fatal and Serious Injury Crashes by Time of Day



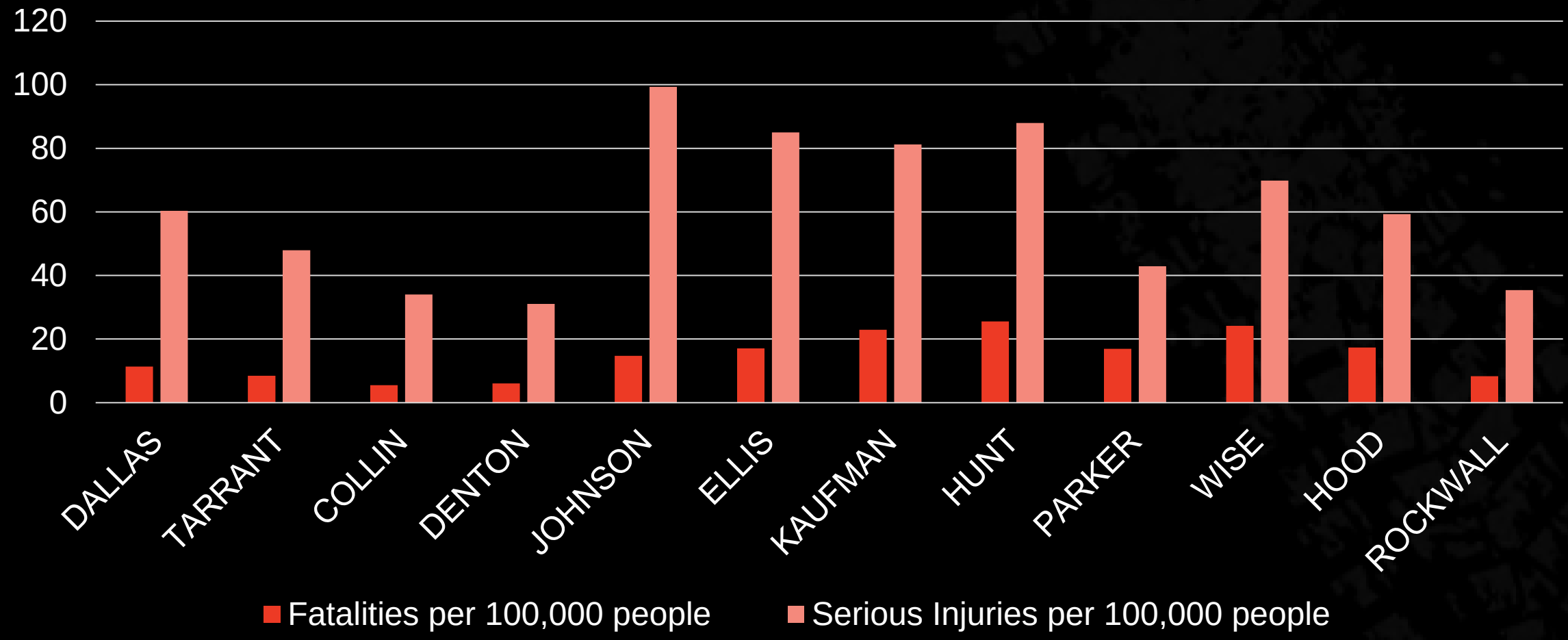
Fatal and Serious Injuries by Time of Day and Day of Week



NCTCOG Fatal and Serious Injuries by Lighting Conditions

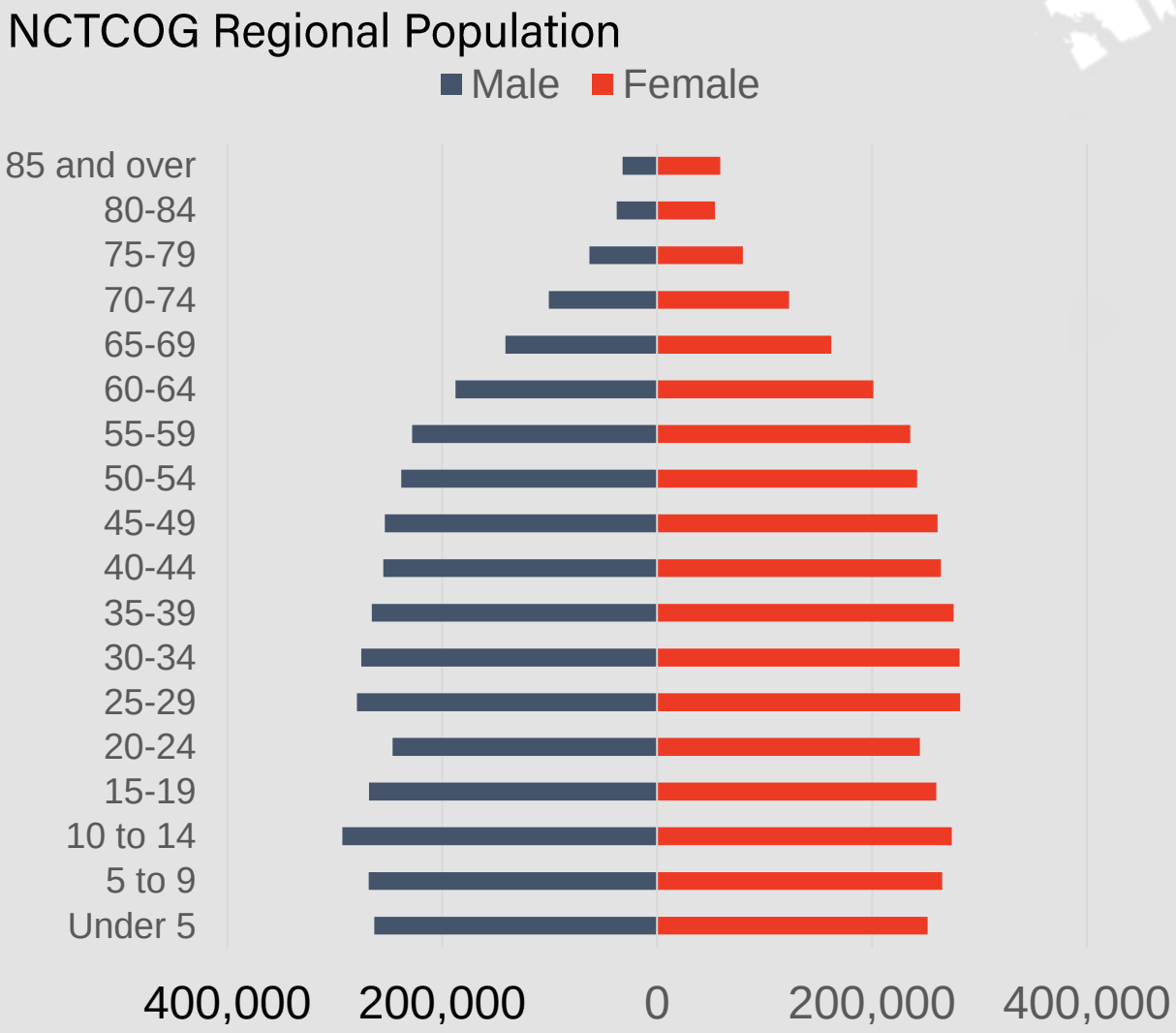


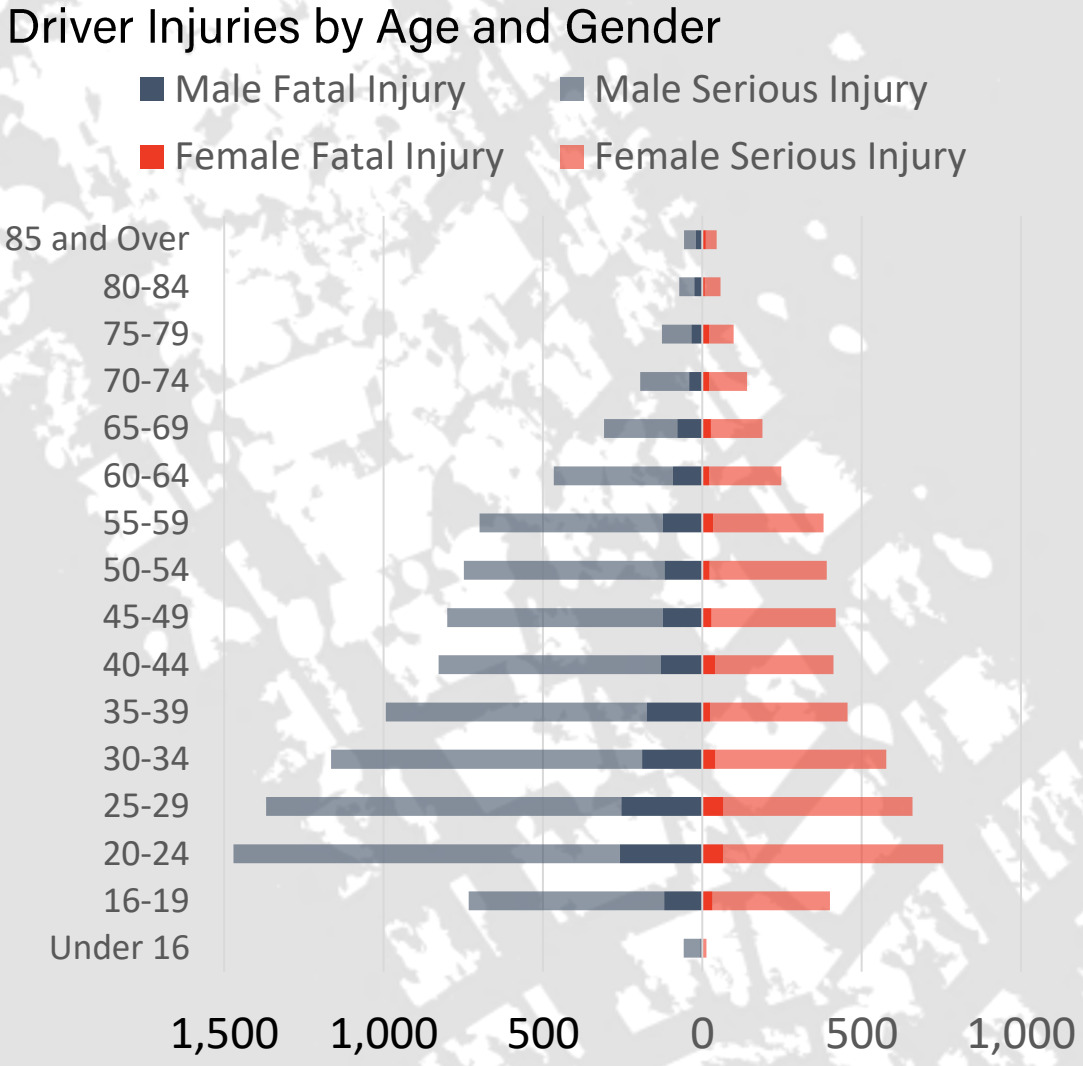
NCTCOG Fatal and Serious Injuries by County



2016-2020 CRIS Data

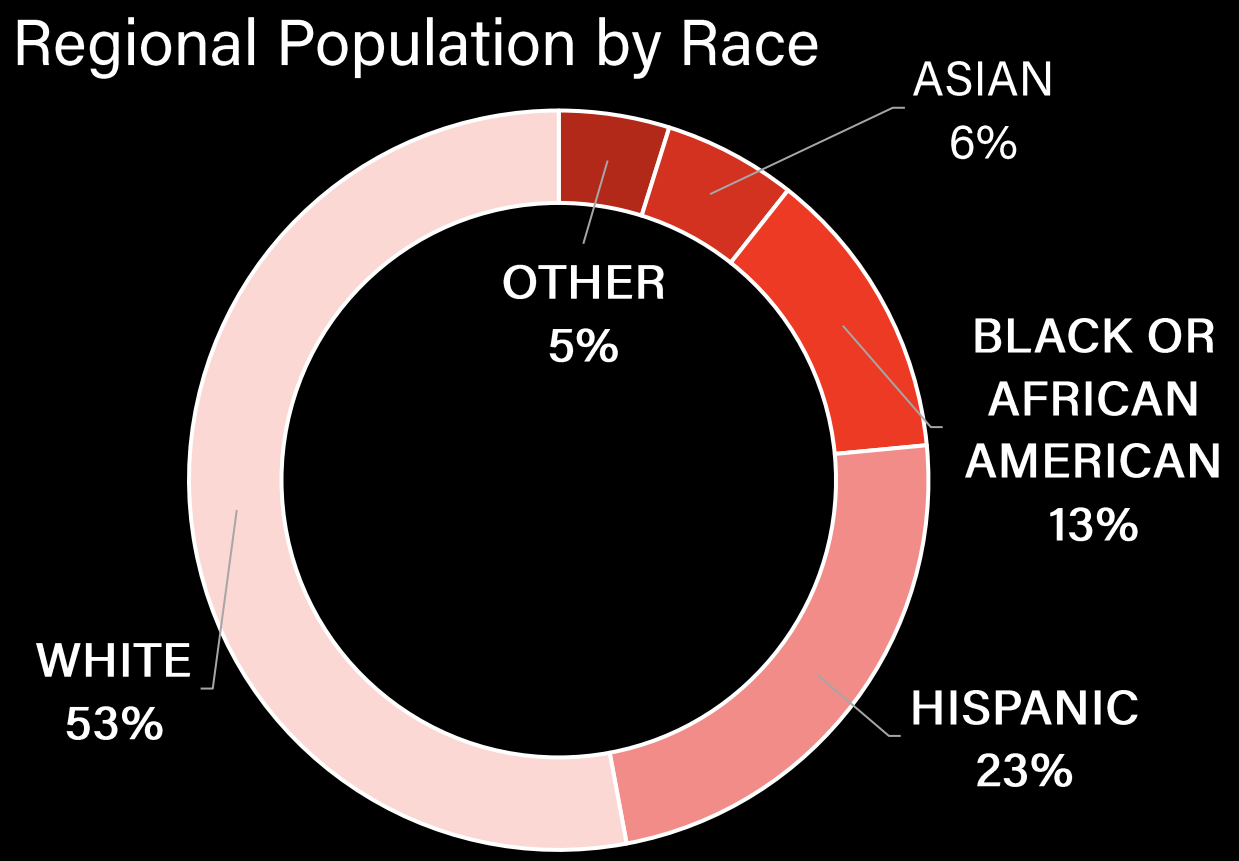
NCTCOG Fatal and Serious Injuries by Age and Gender

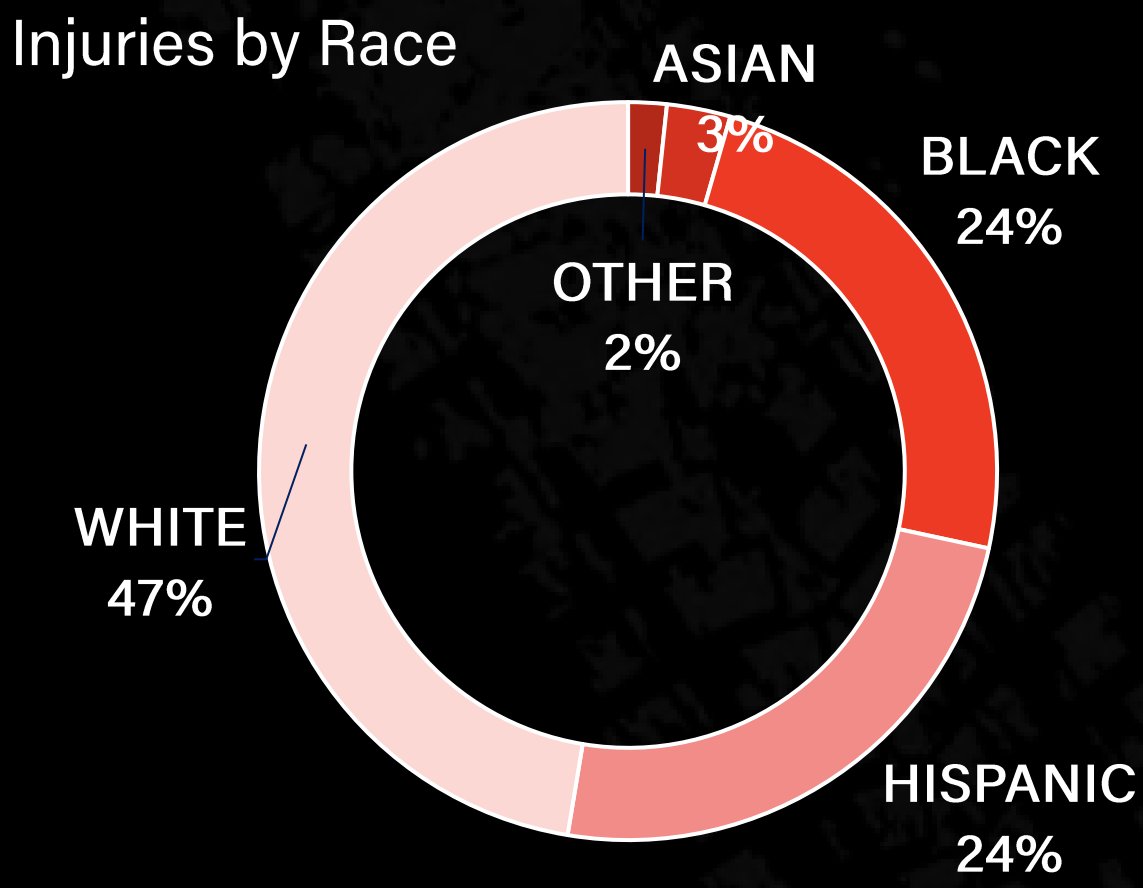




Regional population census data (2016-2020) from NHGIS.org

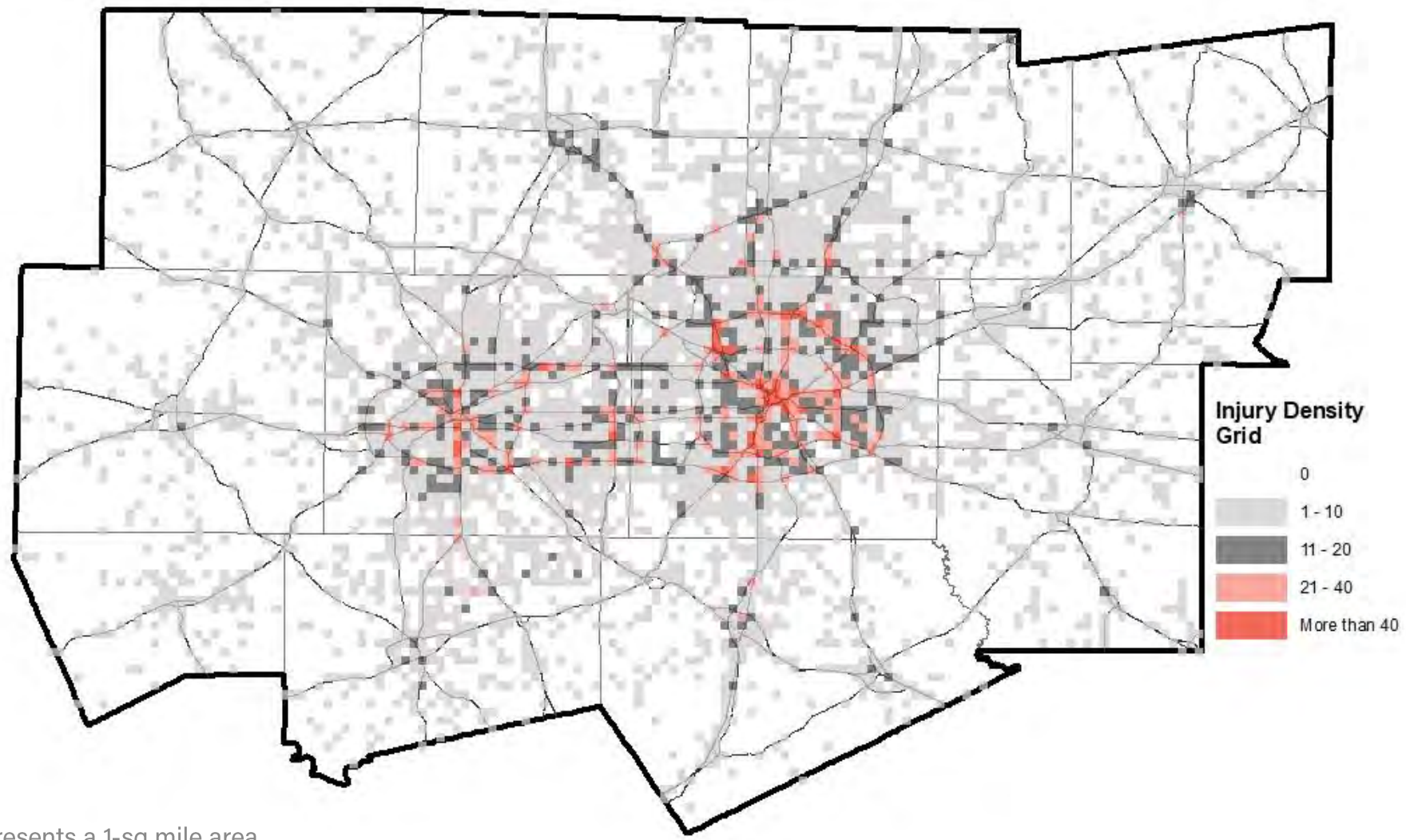
NCTCOG Fatal and Serious Injuries by Ethnicity





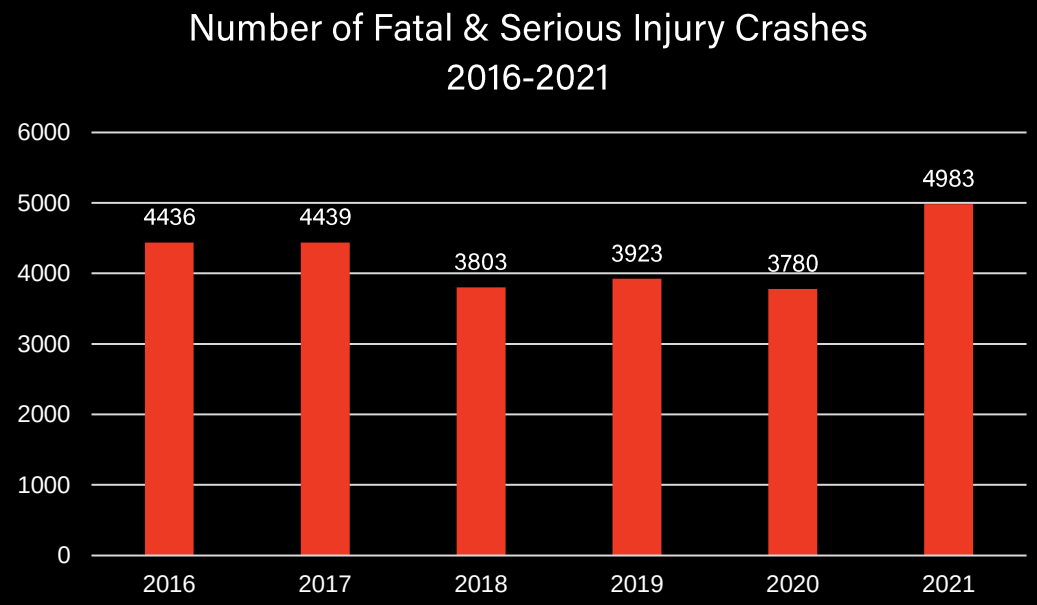
Regional Population census data (2016-2020) from NHGIS.org

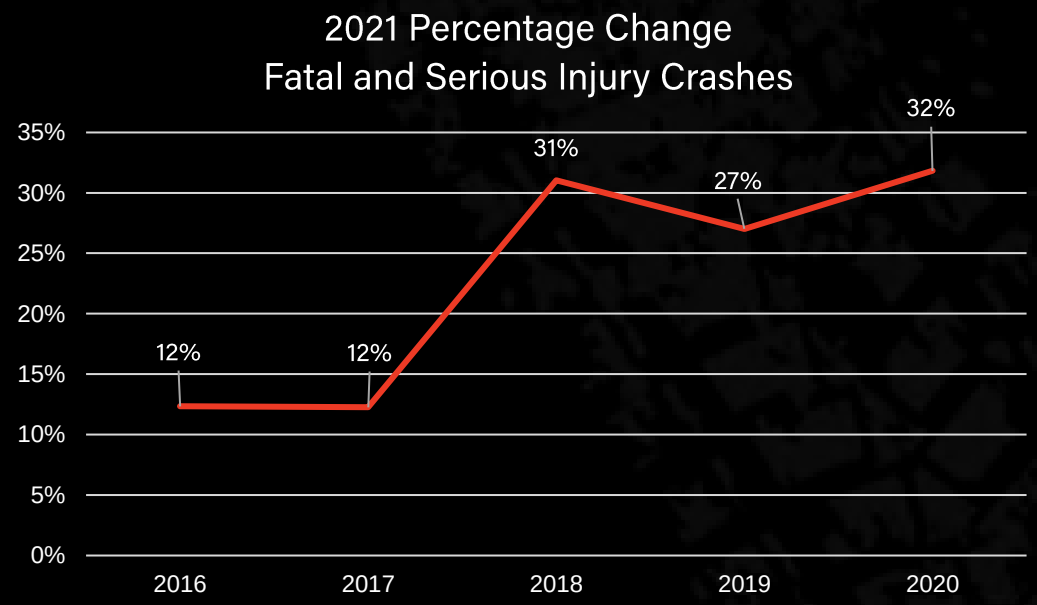
Fatal and Serious Injuries by Locations



Each Square represents a 1-sq mile area.

Updating Data 2021 Fatal and Serious Injury Crashes





Crashes occurred in the 16-County NCTCOG region on all roadway types.

Emphasis Areas

Data Analysis – Identifying Emphasis Areas

- FHWA recommends the *Crash Data Summary Template Tool*
- Compare percentage of fatal and serious injuries to all injuries for each data field
  - If fatal and serious injury crashes are 5% or 2x higher than the percentage of all injuries, it is considered an overrepresentation
- Can compare to other geographies

Crash Data Summary Template Tool: https://safety.fhwa.dot.gov/LRSPDIY/downloads/Crash_Data_Summary_Template.xlsm

Crash Data Template Tool

Fatal and Serious Injuries

All Injuries

Year 1 - Year 5 Subject Data	HGAC		State of Texas		NCTCOG Area		HGAC		State of Texas		NCTCOG Area	
	2016 - 202	%	2016 - 2020	%	2016 - 2020	%	2016 - 2020	%	2016 - 2020	%	2016 - 2020	%
Helmet Usage (Motorcycle)												
Worn, damaged	871	32.6%	2530	31.3%	954	32.6%	2,456	24.7%	7,174	26.8%	2,665	25.6%
worn, not damaged	257	9.6%	731	9.0%	242	8.3%	2,122	21.4%	5,091	19.0%	2,002	19.2%
worn, unknown damage	222	8.3%	585	7.2%	267	9.1%	991	10.0%	2,466	9.2%	1,098	10.5%
not worn	1189	44.5%	3925	48.5%	1270	43.4%	3,740	37.7%	10,556	39.4%	3,663	35.2%
unknown if worn	130	4.9%	319	3.9%	195	6.7%	619	6.2%	1,522	5.7%	983	9.4%
Helmet Usage (Bicycle)												
Worn, damaged	33	5.9%	3	14.3%	50	12.5%	121	3.3%	9	6.8%	141	5.0%
worn, not damaged	33	5.9%	1	4.8%	18	4.5%	332	9.2%	22	16.7%	334	11.8%
worn, unknown damage	17	3.0%	0	0.0%	26	6.5%	121	3.3%	7	5.3%	161	5.7%
not worn	468	83.0%	12	57.1%	283	70.8%	2,734	75.5%	66	50.0%	1,981	69.7%
unknown if worn	46	8.2%	5	23.8%	23	5.8%	314	8.7%	28	21.2%	225	7.9%
Alcohol Involvement												
Yes	1474	8.4%	13656	16.1%	2852	14.0%	15,722	2.1%	122,310	4.0%	28,756	4.7%
No	16083	91.6%	71040	83.9%	17529	86.0%	720,933	97.9%	2,954,836	96.0%	583,906	95.3%
Drug Involvement												
Yes	302	1.7%	4951	5.8%	1396	6.8%	2,230	0.3%	21,579	0.7%	5,464	0.9%
No	17255	98.3%	79745	94.2%	18985	93.2%	734,425	99.7%	3,055,567	99.3%	607,198	99.1%

If fatal and serious injury crashes are 5% or 2x higher than the percentage of all injuries, it is considered an overrepresentation

Analyzed Data Categories with Overrepresentations of Fatal and Serious Injuries

Alcohol Involvement	Functional Class	**Road Surface Condition**
By Weekday	**Helmet Usage (Bicycle)**	Roadway Alignment
CMV Involved	**Helmet Usage (Motorcycle)**	**Roadway Part**
Crash Hour	**Intersection Related**	**Rural Flag**
Crash in Work Zone	**Light Conditions**	**Speeding Related**
Crash Location	**Most Harmful Event**	Toll Road
Crash Month	**Motorcycle Involved**	**Traffic Control Device**
Crashes Involving Impaired Drivers	**On System**	Weather
Distracted Driving Related	**Person Type**	Within Intersection Area
Drug Involvement	Posted Speed Limit	**Wrong Way Driving Crashes**
First Harmful Event	**Restraint Use**	

Color indicates at least one overrepresentation was found in that field

Regional Emphasis Areas Based on Overrepresentation Analysis

Regional Emphasis Areas

- Speeding
- Distracted driving
- Impaired driving
- Intersection safety
- Bicyclist and pedestrian safety
- Roadway and lane departures
- Occupant protection
- Motorcycles

Additional "Areas of Concern"

- Wrong way driving
- Crashes occurring at night*
- Younger drivers*
- Older road users (65+)*

*Represented within multiple emphasis areas

Emphasis Area Analysis and Risk Factors

With Emphasis Areas identified, we need to:

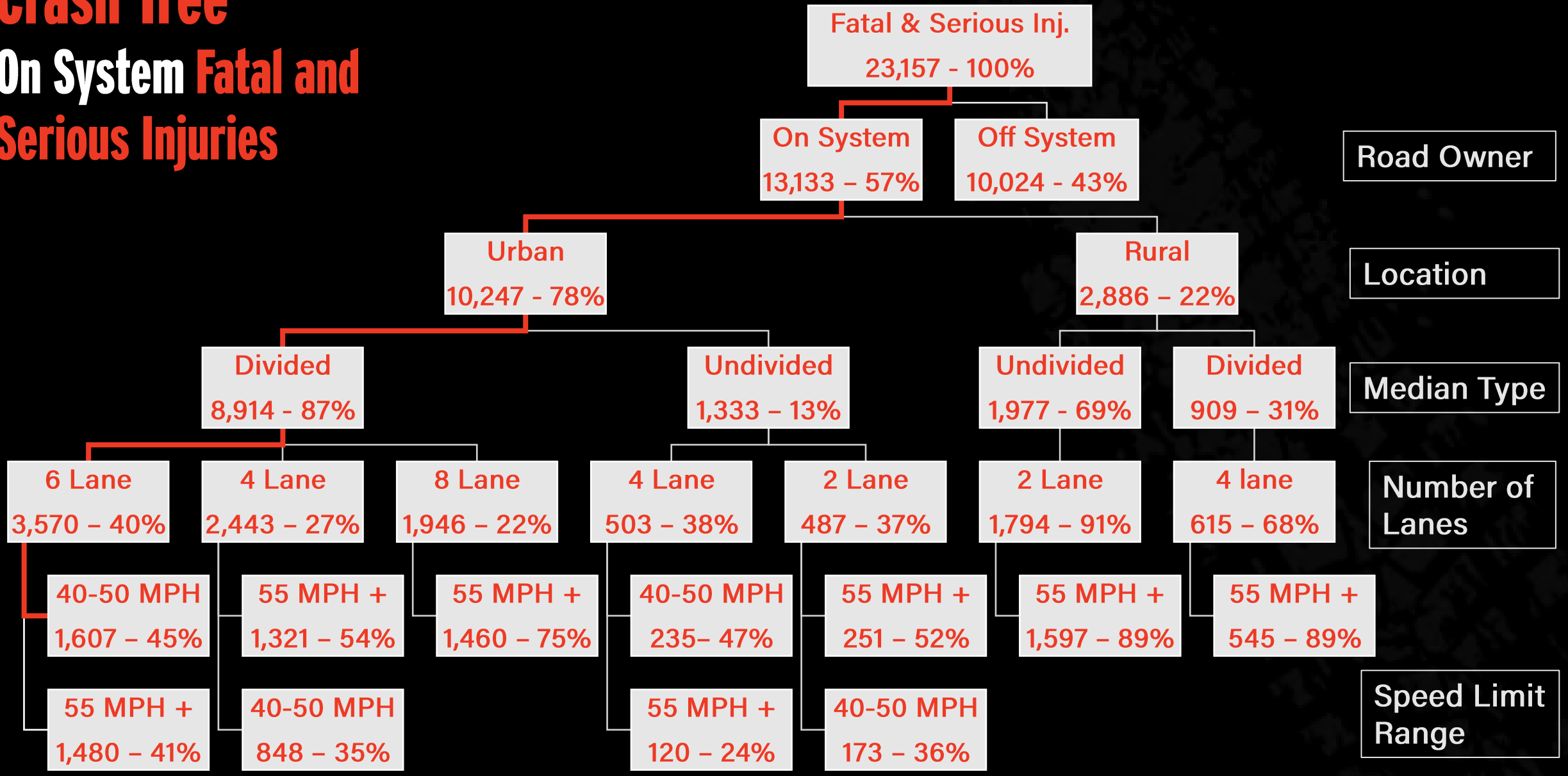
- ✓ Identify Target Crash Types
- ❑ **Identify Focus Facility Types**
- ❑ **Identify and Evaluate Risk (Roadway) Factors**

A Crash Tree helps breakdown data to help identify where fatal and serious injuries are systemically occurring and what other factors are contributing to these crashes.

FHWA Crash Tree Tool: https://safety.fhwa.dot.gov/LRSPDIY/safety-data.cfm#

Crash Tree

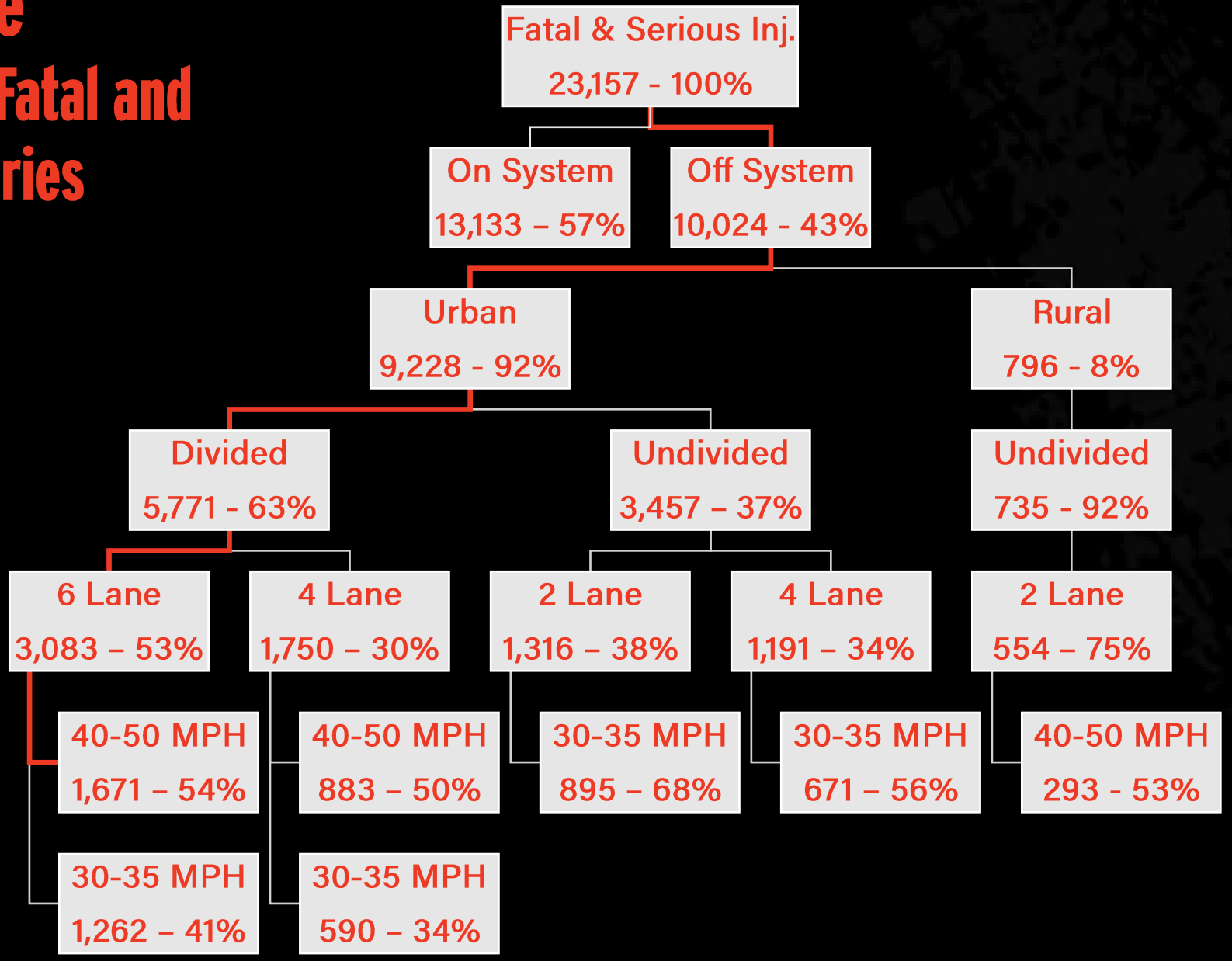
On System Fatal and Serious Injuries



Rural Crashes occurred in an area with a population less than 5,000.

Crash Tree

Off System Fatal and Serious Injuries



Road Owner

Location

Median Type

Number of Lanes

Speed Limit Range

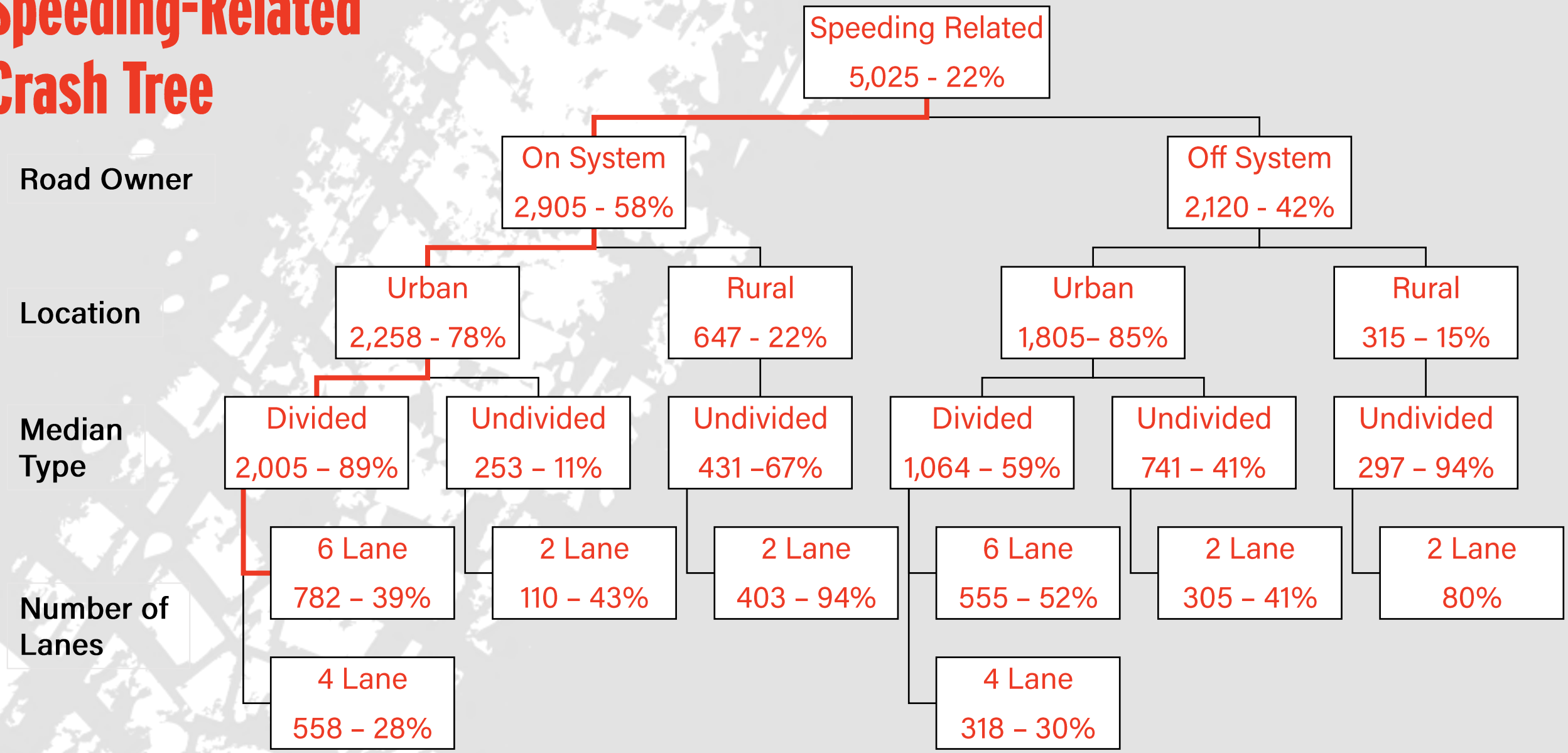
Rural Crashes occurred in an area with a population less than 5,000.

Emphasis Areas by System Location

	Percentage of all Fatal and Serious Injuries	On System	Off System	On System Urban	On System Rural	Off System Urban	Off System Rural
All Fatal and Serious Injuries	**100%**	**57%**	43%	**78%**	**22%**	**92%**	**8%**
Nighttime Crashes	44%	58%	42%	**83%**	17%	92%	8%
Intersections	35%	46%	**54%**	80%	20%	**97%**	3%
Roadway & Lane Departures	29%	58%	42%	75%	25%	82%	**18%**
Speeding	22%	58%	42%	78%	22%	85%	**15%**
Occupant protection	14%	57%	43%	75%	25%	87%	**13%**
Motorcycles	13%	56%	44%	79%	21%	90%	10%
Bicyclist & Pedestrians	12%	42%	**58%**	**91%**	9%	**98%**	2%
Impaired Driving	8%	54%	46%	70%	**30%**	84%	**16%**
Younger Road Users	7%	51%	49%	73%	**27%**	86%	**14%**
Distracted Driving	6%	61%	39%	73%	**27%**	88%	12%
Older Road Users	6%	61%	39%	72%	**28%**	90%	10%
Wrong Way Driving	2%	**71%**	29%	55%	**45%**	94%	6%

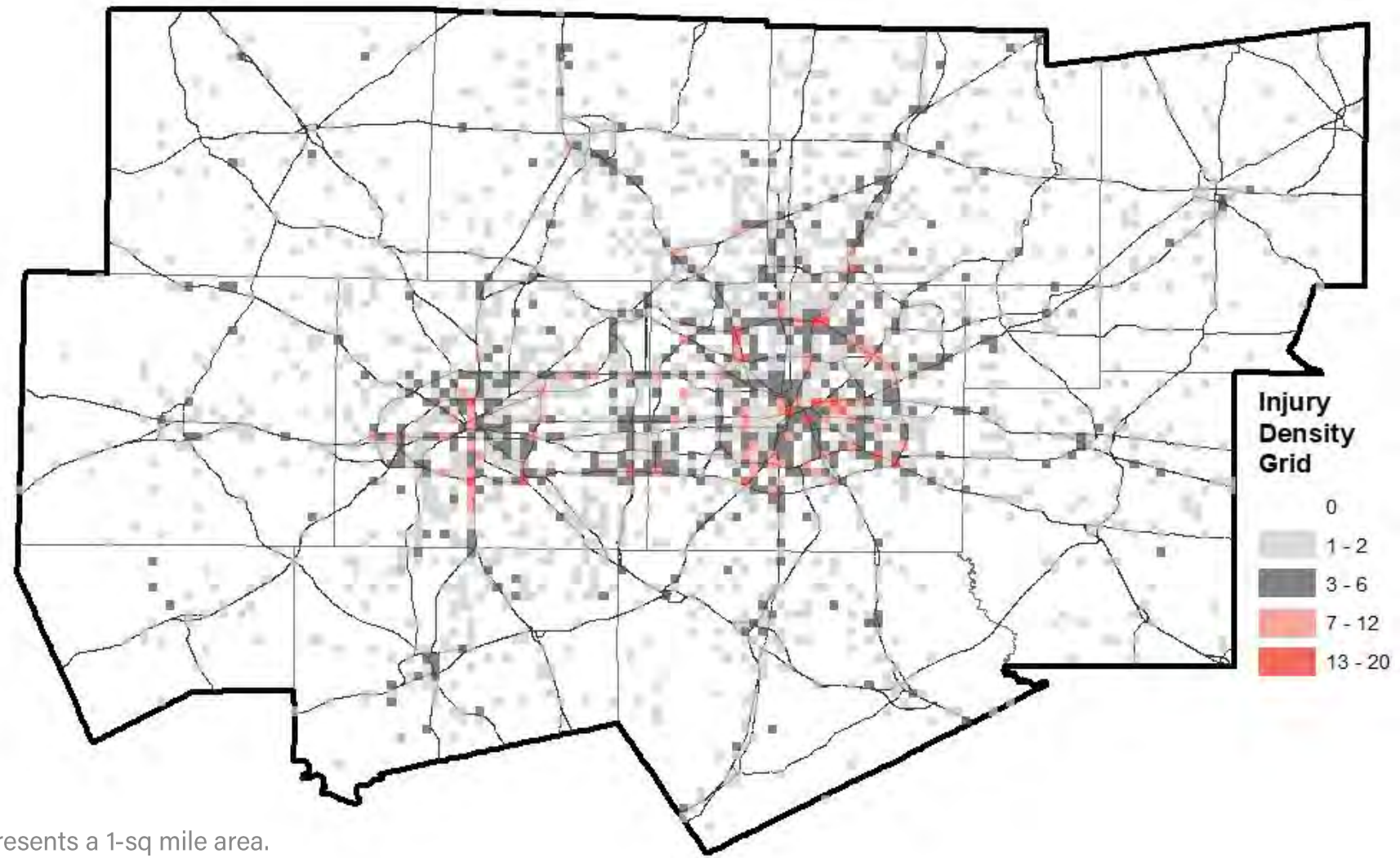
Highlighted fields show a 5% or higher percentage compared to all fatal and serious injuries

Speeding-Related Crash Tree



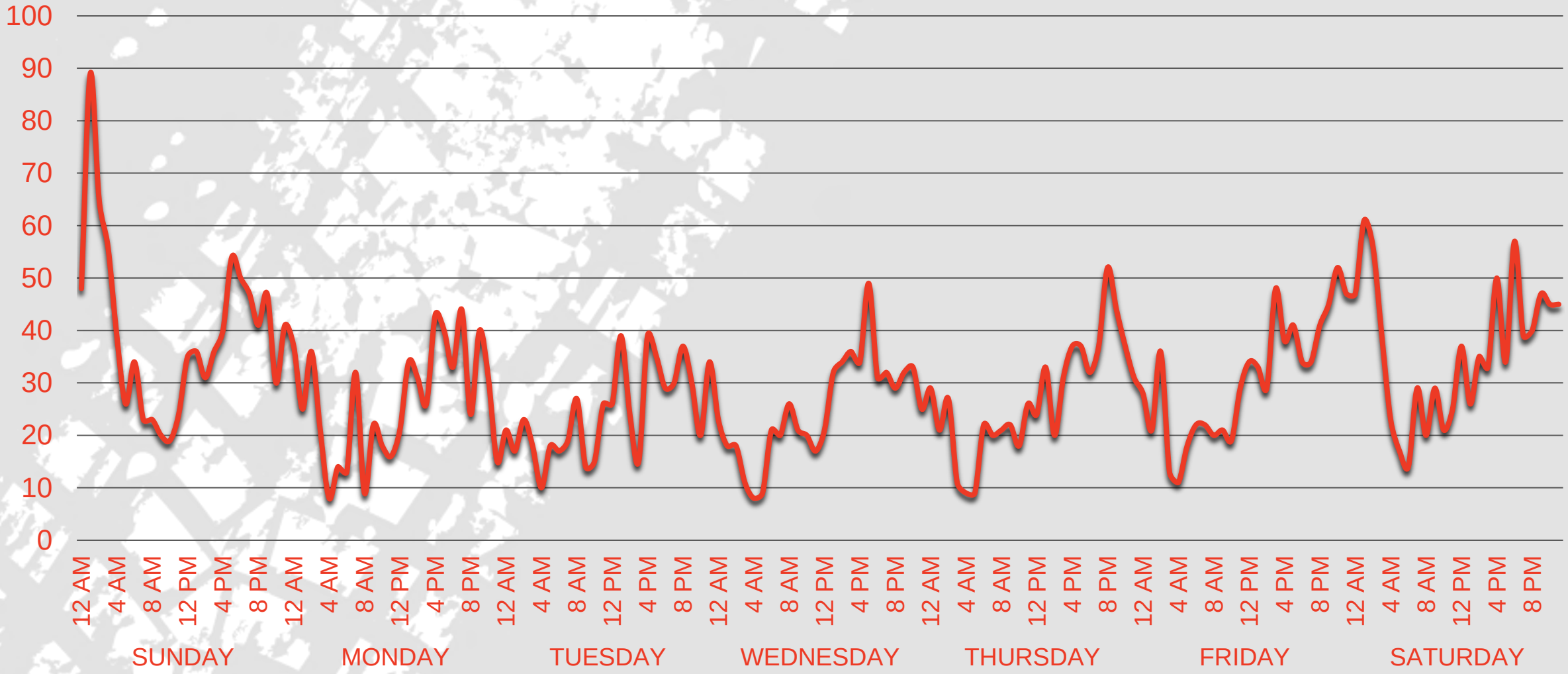
Rural Crashes occurred in an area with a population less than 5,000.

Speeding-Related Fatal and Serious Injury Locations

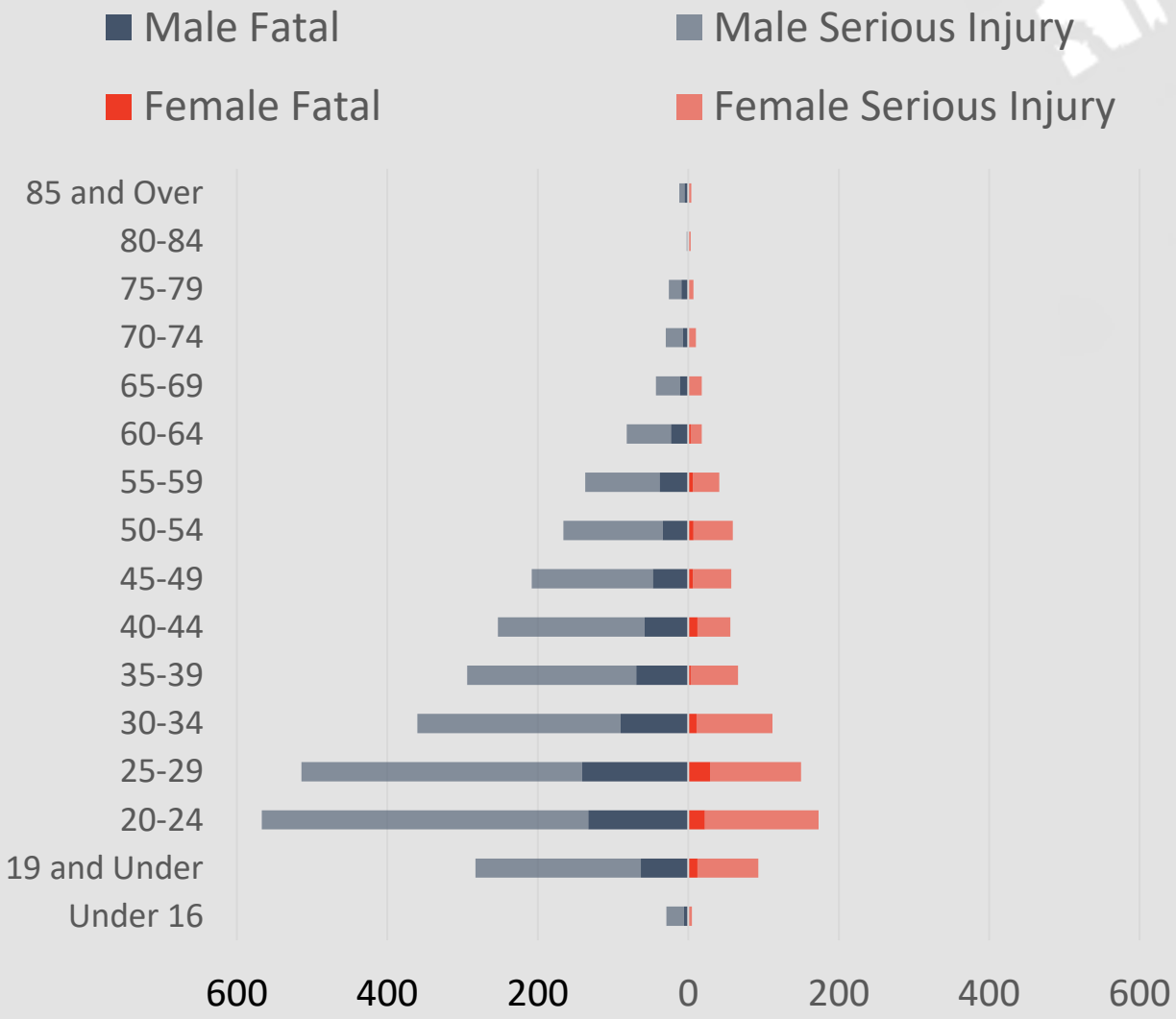


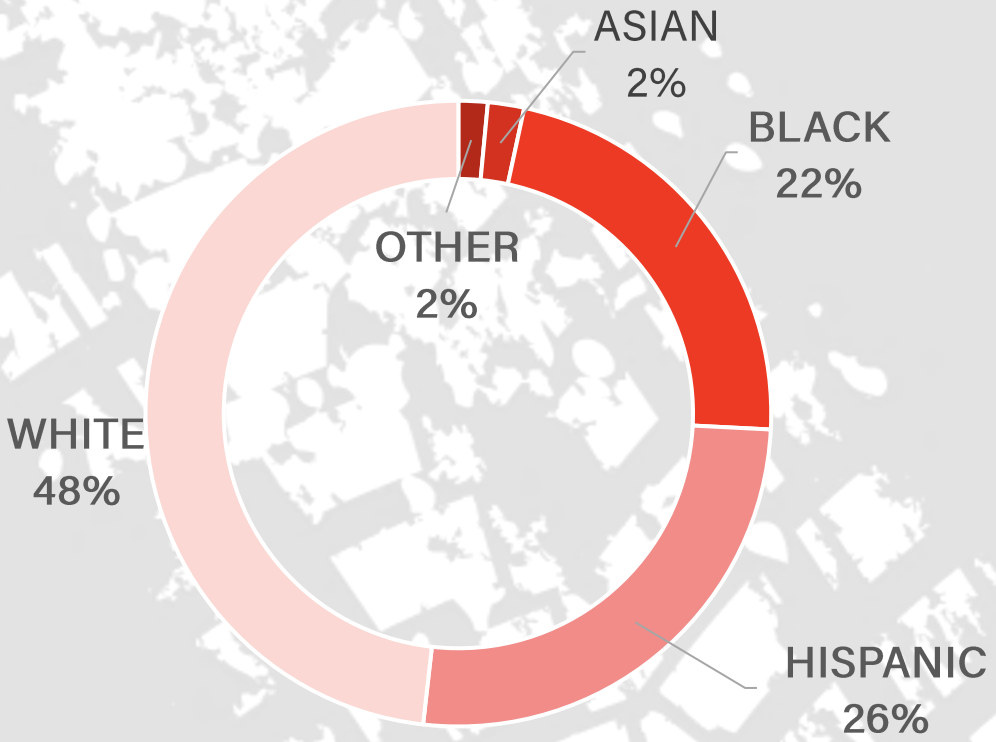
Each square represents a 1-sq mile area.

Speeding-Related by Time of Day and Day of Week



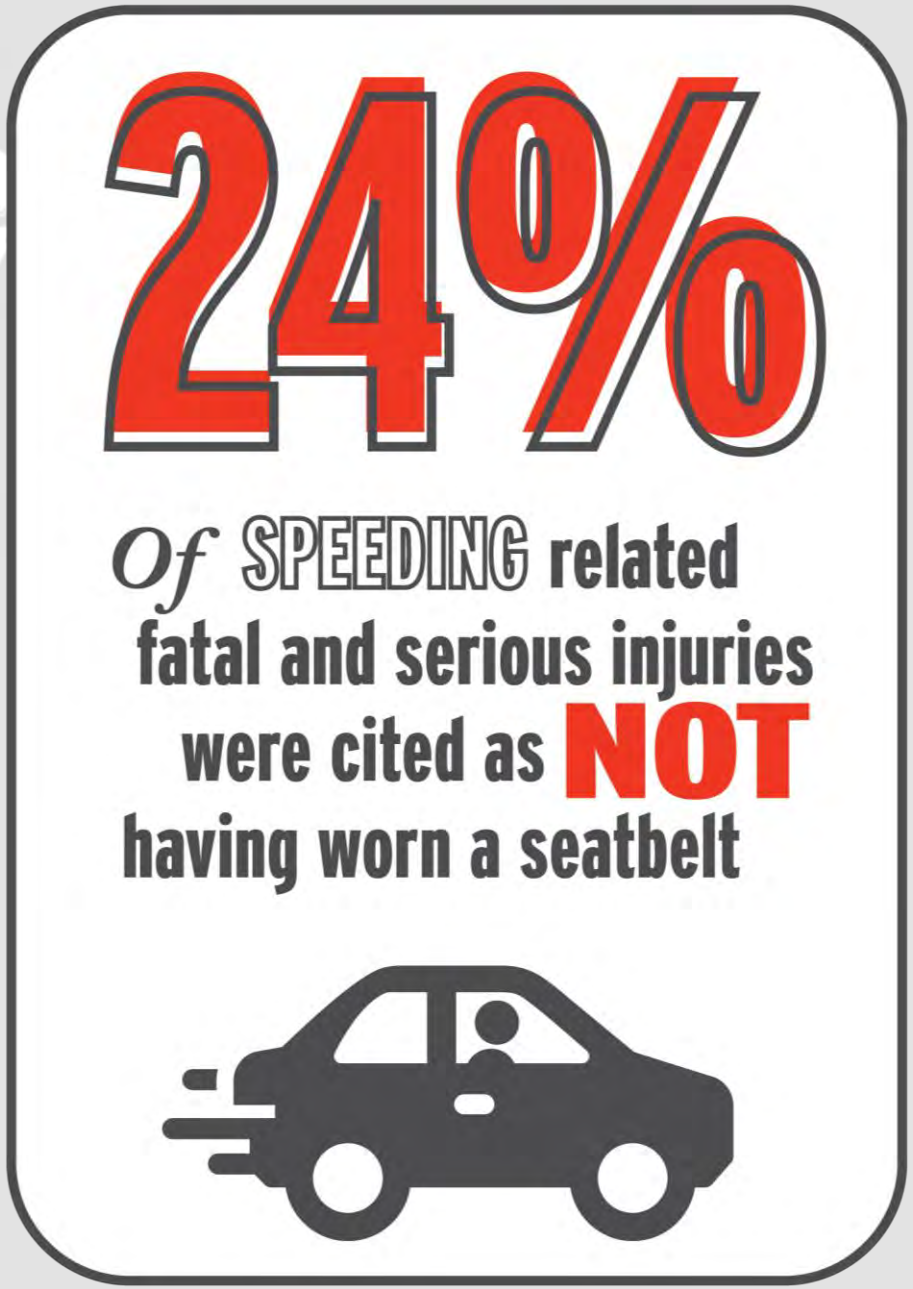
Speeding-Related Demographics





Speeding-Related Crash Characteristics

- Motorcyclists accounted for 20% of all speeding-related fatal and serious injuries but only 11% of non-speeding-related injuries.
- 47% of rural speeding-related fatal and serious injuries occurred at curves but only 20% of rural non-speeding-related injuries occurred at curves.
- 60% of speeding-related injuries resulted from one motor vehicle crash but only 39% of non-speeding-related injuries involved one motor vehicle only.



Emphasis Area Takeaways (2016-2020)

Personal Restraint Usage

14%

Of fatal and serious injuries were cited as **NOT** having worn a seatbelt

37%

Of fatal and serious injuries cited as **NOT WEARING A SEATBELT** were also speeding related crashes

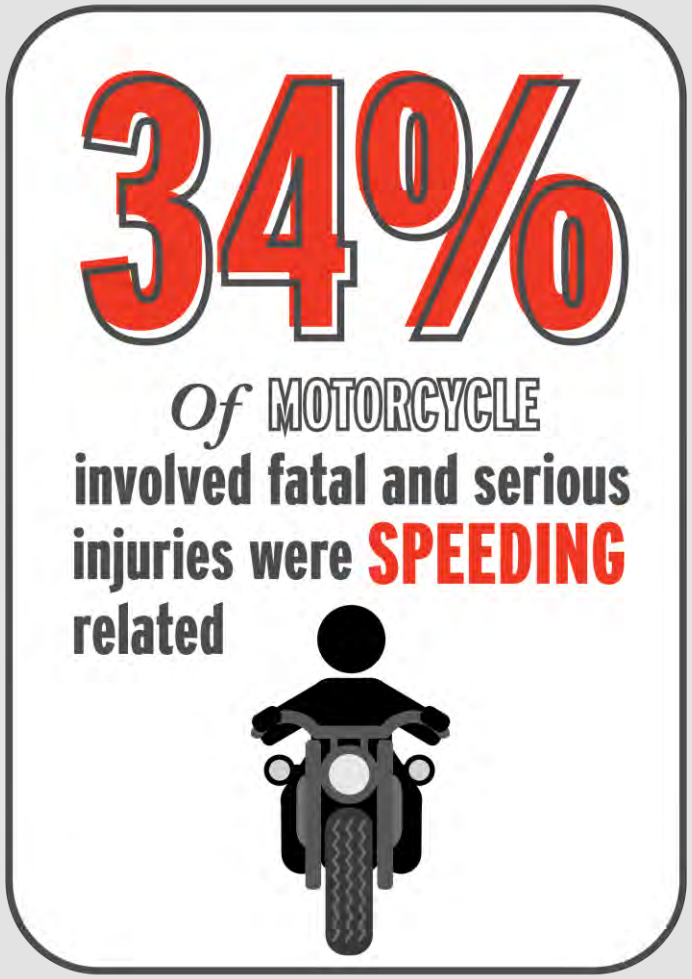
53%

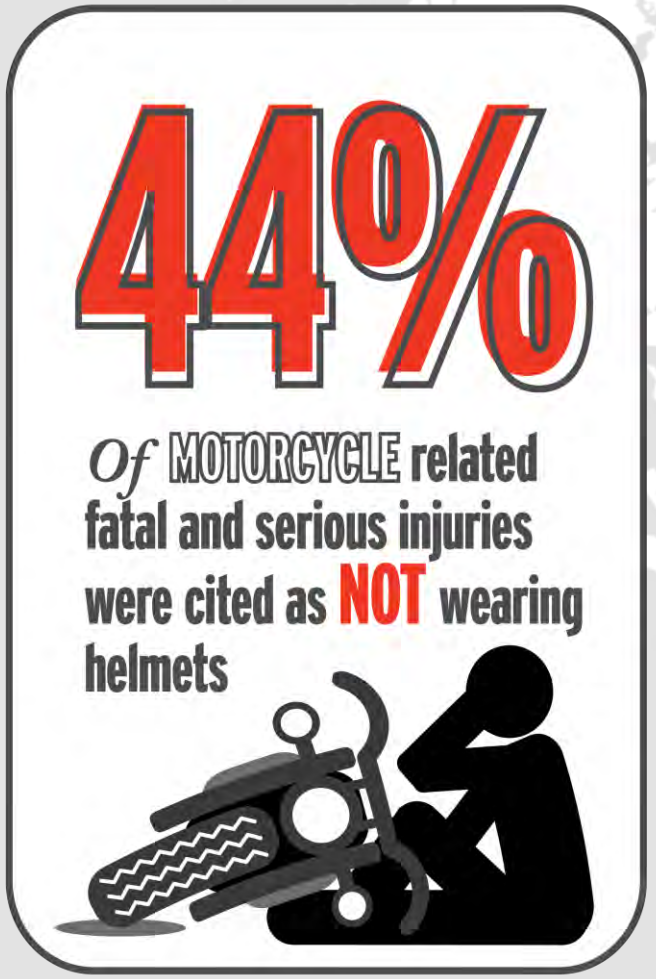
Of fatal and serious injuries cited as **NOT WEARING A SEATBELT** were also run off the road related

19%

Of fatal and serious injuries cited as **NOT WEARING A SEATBELT** were also impaired driving related

Motorcycles





40% of motorcycle-related rural fatal and serious injuries occurred at curves

Intersection-Related

89%

Of **INTERSECTION** related injuries occurred in urban areas

41% of intersection-related injuries occurred in right angle crashes.

45%

Of OLDER ROADWAY USERS (65+) fatal and serious injuries occurred at **INTERSECTIONS**

Impaired Driving, Wrong Way Driving, Bike/Ped

80%

Of **URBAN IMPAIRED DRIVING** RELATED FATAL AND SERIOUS INJURIES OCCURRED AT NIGHT (DARK CONDITIONS)

29%

Of **WRONG WAY** driving fatal and serious injuries are also **IMPAIRED DRIVING** related

60%

Of **URBAN BIKE AND PEDESTRIAN** fatal and serious injuries occurred at night (dark conditions)

Roadway and Lane Departure and Distracted Driving

53%

Of ROADWAY AND LANE DEPARTURE related fatal and serious injuries occurred at **NIGHT**

42%

Of **DISTRACTED DRIVING** related fatal and serious injuries were run off the road related crashes

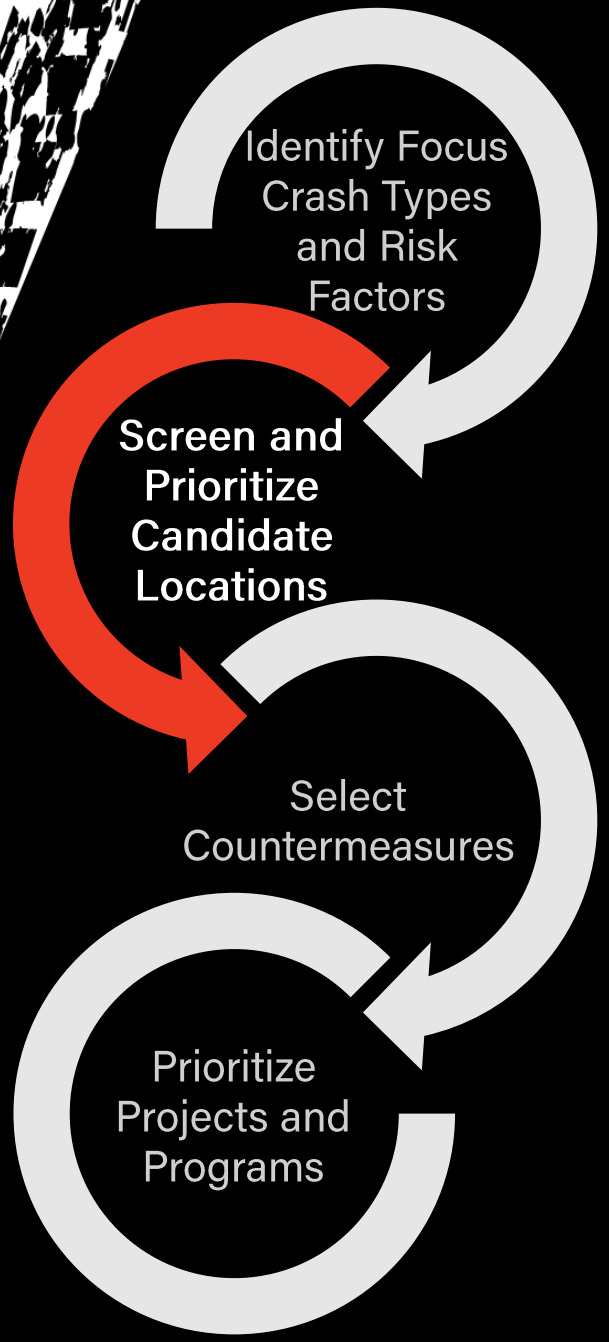
High Injury Network

DRIVE AWARE north texas

Screen and Prioritize Candidate Locations

The Systemic Safety Analysis approach evaluates risk across an entire roadway system versus managing risk at specific locations.

However, it is also helpful to identify roadways that have a history of a high number of fatal and serious injuries.



High Injury Network

- Network of designated road segments where the highest concentrations of fatal and serious injury crashes occur
- Five-year range of crash data from 2016-2020
- Can be used to help prioritize safety improvements in the region and be used in tandem with the findings of our systemic analysis

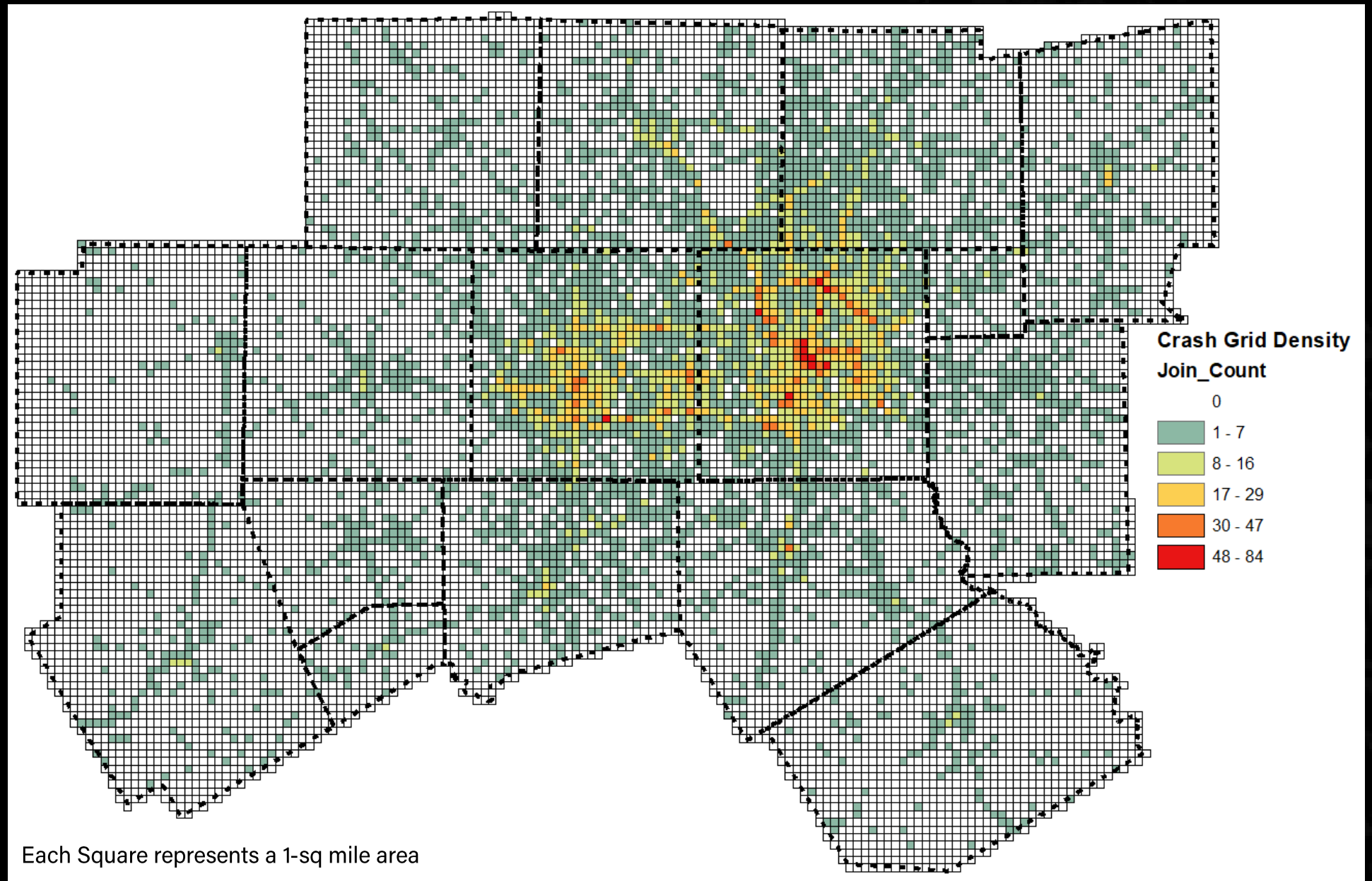
High Injury Network Methodology

- Create a grid density map of fatal and serious injury crashes
- Identify the road segments within the selected grids
- Identify the number of crashes that occurred on each road segment
- Use the scoring formula to show how each segment should be prioritized

High Injury Network Project Ranking

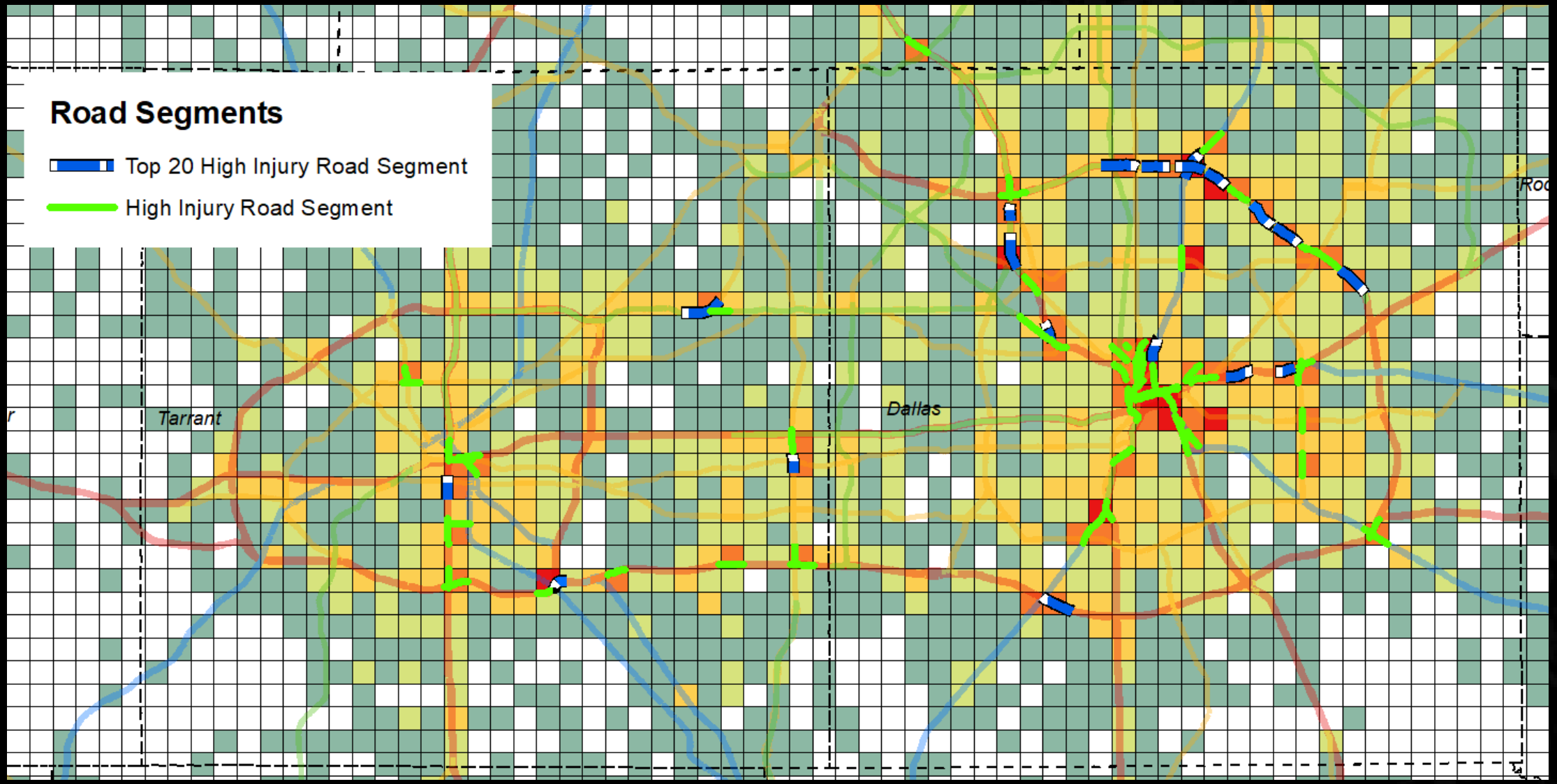
- Prioritization Score = Number of Fatal and Serious Injury Crashes + (2 * Number of Fatal Crashes) + (1* Number of Serious Injury Crashes) / VMT

High Injury Network Crash Density Map



Each Square represents a 1-sq mile area

High Injury Network Road Segment Map



Each Square represents a 1-sq mile area

High Injury Network Highest Scoring Road Segment

- The top five scoring road segments all occurred on IH 635
- Top two scoring road segments are located between Dallas North Tollway and US 75
- The remaining three road segments are located between US 75 and IH 30

High Injury Network Road Segment Crash Summary

- Majority of road segments located in Dallas and Tarrant Counties with one road segment located in Denton County
- 1,355 Serious Injury Crashes
- 336 Fatal Crashes
- 1,691 Total Crashes

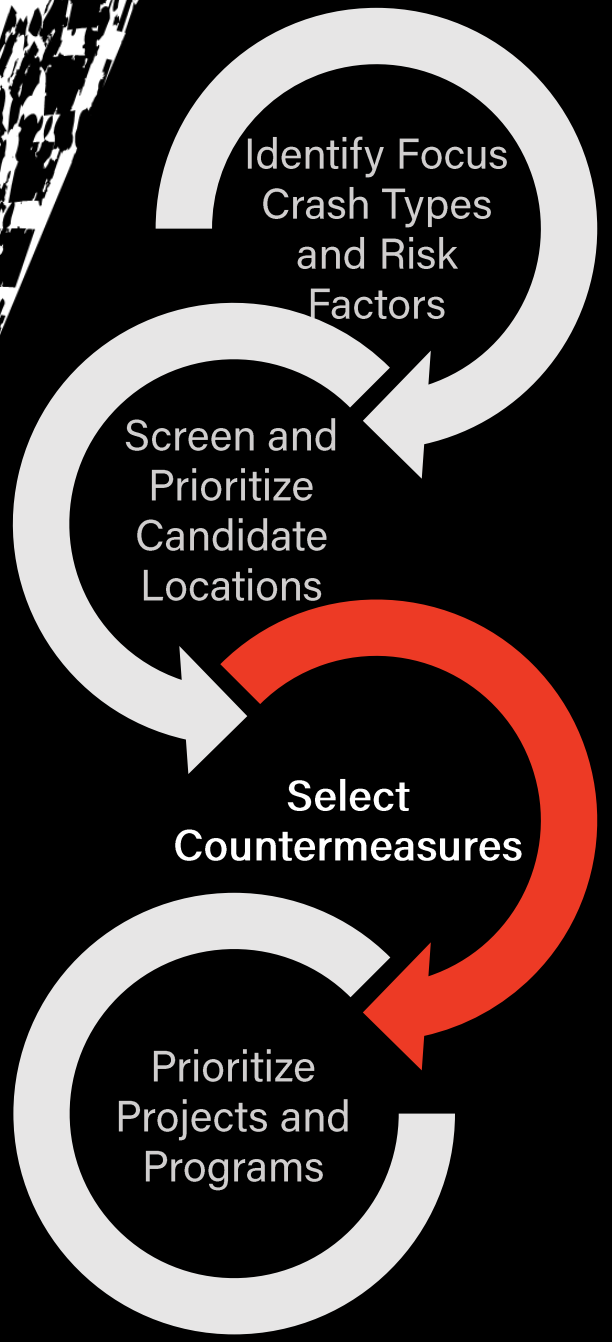
Safety Countermeasures

Countermeasure Selection

The third step in the Systemic Safety Analysis approach identifies potential countermeasures for each emphasis area.

Main Tasks within this step of the Systemic Safety Analysis

1. Assemble comprehensive list of countermeasures
2. Evaluate/screen countermeasures
3. Select final countermeasures



What are safety countermeasures?

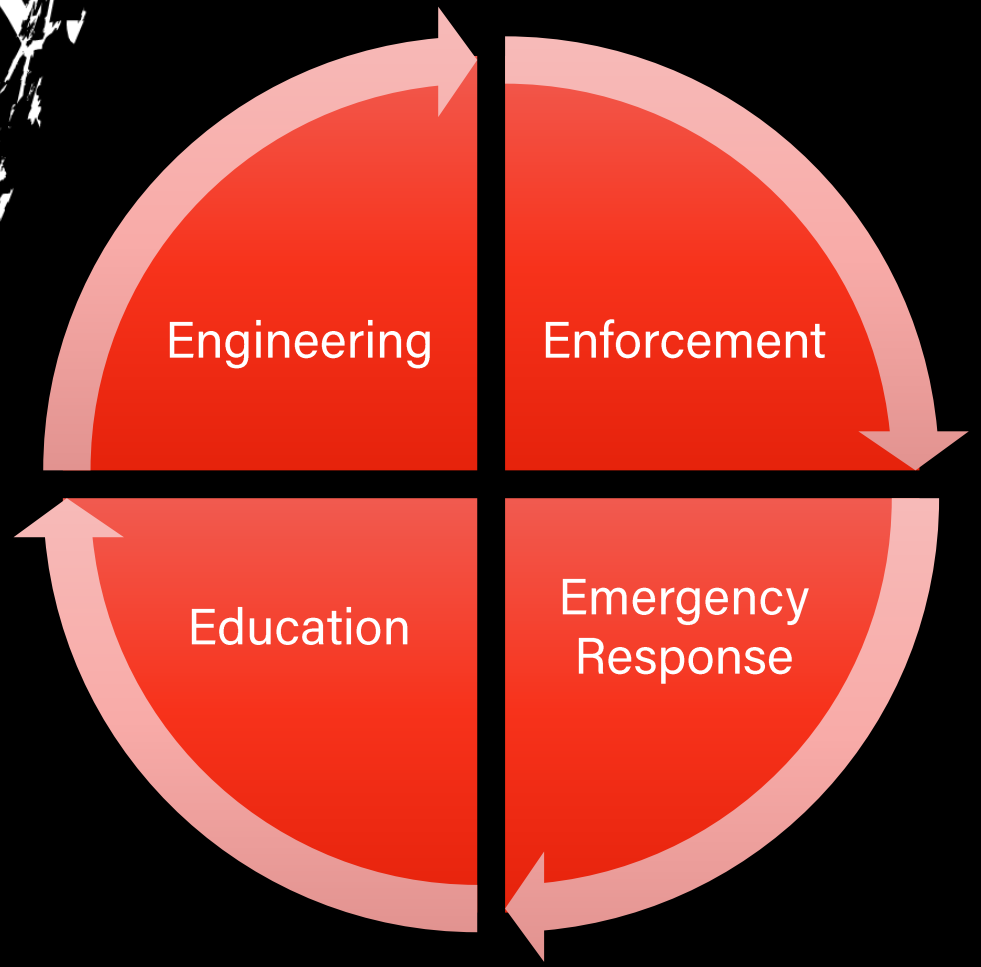
Safety countermeasures can be any action undertaken to decrease the risk of a crash occurring or to reduce the severity of a crash.

Countermeasures may involve engineering upgrades, behavioral education campaigns, traffic enforcement programs, emergency response, or emergency response related.

Countermeasure selection should be data driven and risk-based.

Things to consider:

1. Cost
2. Location(s)
3. Proven effectiveness
4. Time to implement



Countermeasure Selection Resources

Federal

- Federal Highway Administration Proven Safety Countermeasures
- Highway Safety Manual
- Crash Modification Factor Clearinghouse
- National Highway Traffic Safety Association Countermeasures that Work

State

- Highway Safety Improvement Plan
- Strategic Highway Safety Plan
- A Plan for Saving Lives on Texas Roadways

Example Countermeasures

Countermeasure	Focus	Category
Reduce fatalities and serious injuries by identifying and implementing education and awareness strategies to reduce distracted driving.	Distracted Driving	Education
Improve and increase enforcement capabilities for addressing distracted driving.	Distracted Driving	Enforcement
Increase the installation of engineering countermeasures known to reduce distracted driving.	Distracted Driving	Engineering
Increase education for all road users on the impact of impaired driving and its prevention.	Impaired Driving	Education
Impaired Driving Education and Enforcement	Impaired Driving	Education / Enforcement
Implement technology/strategies to reduce wrong-way crashes.	Impaired Driving / WWD	Engineering
Encourage use of the ICE process in project development by TxDOT and local agencies. Develop case studies, provide training, and conduct outreach.	Intersection Improvements	Education
Signal head backplates with reflective borders.	Intersection Improvements	Engineering
Roundabouts	Intersection Improvements	Engineering
Systemic application of multiple low-cost countermeasures at stop-controlled intersections.	Intersection Improvements	Engineering
Improve data systems for identifying specific intersections and intersection types at high probability for serious injury crashes.	Intersection Improvements	Engineering
Motorcycle Safety Education and Enforcement	Motorcycles	Education / Enforcement
Implement effective methods and tools to prepare older road users to deal with the limitations brought on by the aging process.	Older Roadway Users	Education
Improve mobility options for older road users.	Older Roadway Users	Engineering

Next Steps

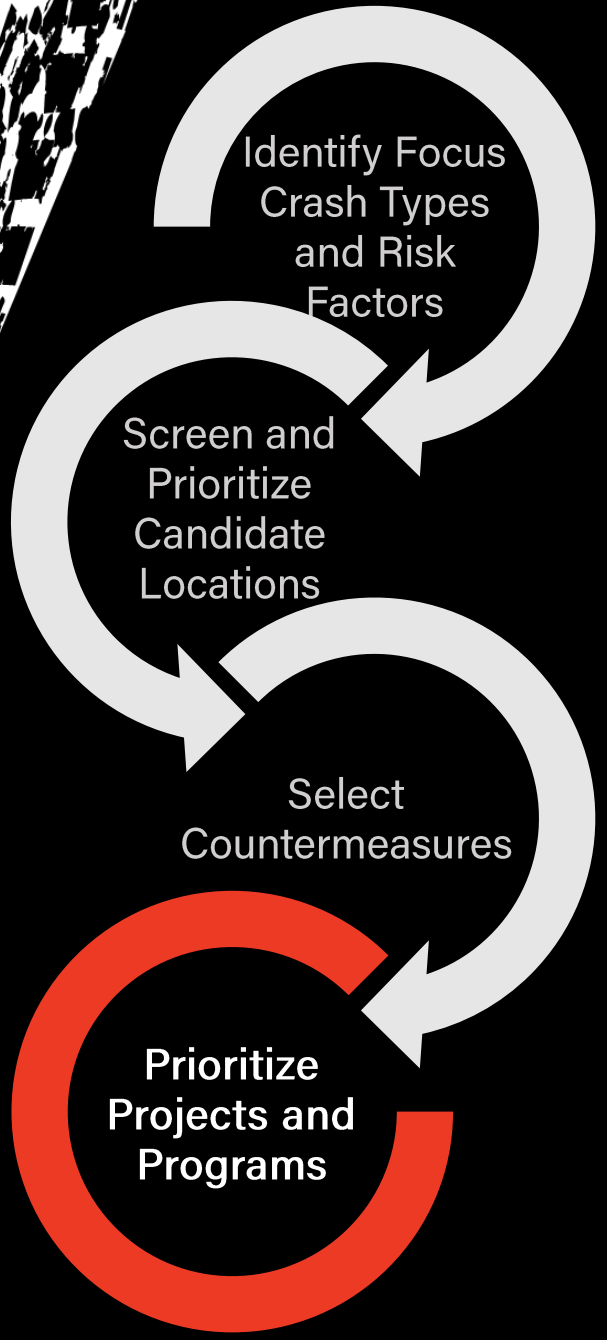
DRIVE AWARE north texas

Prioritize Safety Projects, Programs, and Policies

Develop a list of high-priority safety improvement projects scheduled for implementation. This considers both high-crash locations and system-wide analysis. Note that this step will occur after the Roadway Safety Plan itself is completed.

Main Tasks within the final step of the Systemic Safety Analysis

1. Create decision process for selecting countermeasures
2. Develop safety projects, programs, and policies
3. Prioritize project implementation



Ongoing Processes

- Iterative review of plan and implementation
- Tracking and updating plan as new data becomes available
- Updating and refining High Injury Network
- Evaluating program implementation and effectiveness
- Identify additional funding sources, partners, and technologies

Roadway Safety Plan Schedule

Date	Safety Plan Event/Deadline
July 2021	RSAC - Roadway Safety Plan Overview
October 2021	RSAC - Regional Roadway Safety Plan Preliminary Crash Data Analysis
June 22, 2022	NCTCOG Internal Peer Review
July 22, 2022	RSAC – External Peer Review
Summer 2022	STTC/Public Input/RTC Meetings
Summer/Fall 2022	Publish Final Roadway Safety Plan

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