

# **CITY OF MADISON HIGH INJURY NETWORK 2017-2019**



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Department of Civil and Environmental Engineering  
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# Overview

## Vision Zero

- Strategy aimed at eliminating traffic fatalities and severe injuries while increasing safe, healthy, and equitable mobility for all road users
- Originated in Sweden in the 1990s
- Proven successful across Europe and gaining acceptance in the US
- The City of Madison is in the process of adopting Vision Zero



# Overview

## Vision Zero Commitment

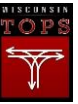
- Build and sustain leadership, collaboration, and accountability
  - Transportation professionals
  - Public health officials
  - Police
  - Policymakers and community members
- Collecting, analyzing, and using **DATA**
  - Understand trends
  - Potential disproportionate impacts on certain populations
- Prioritizing equity and community engagement
- Managing speed to safe levels
- Setting timeline to achieve zero traffic deaths and serious injuries



# Overview

## Vision Zero: High Injury Network (HIN)

- Recommends the implementation of High Injury Networks
- **Data driven approach** to safety analysis and decision making
- Mapping of roadways in the network where high number and severe crashes concentrate
- Contribute to:
  - Determine geographic areas where crashes are concentrated
  - Focus efforts on the most challenging areas and crash factors
  - Strengthen collaboration for road improvements and education campaigns
- Prioritize investments



# Methodology

## ❖ City of Madison Staff

- Network segmentation
  - 4,590 intersections
  - 8,855 segments
- Crash data collection
  - Three years (2017-2019)
  - Intersections: 250 ft buffer
  - Segments: continuous mid-block roadway sections outside the 250 ft buffer

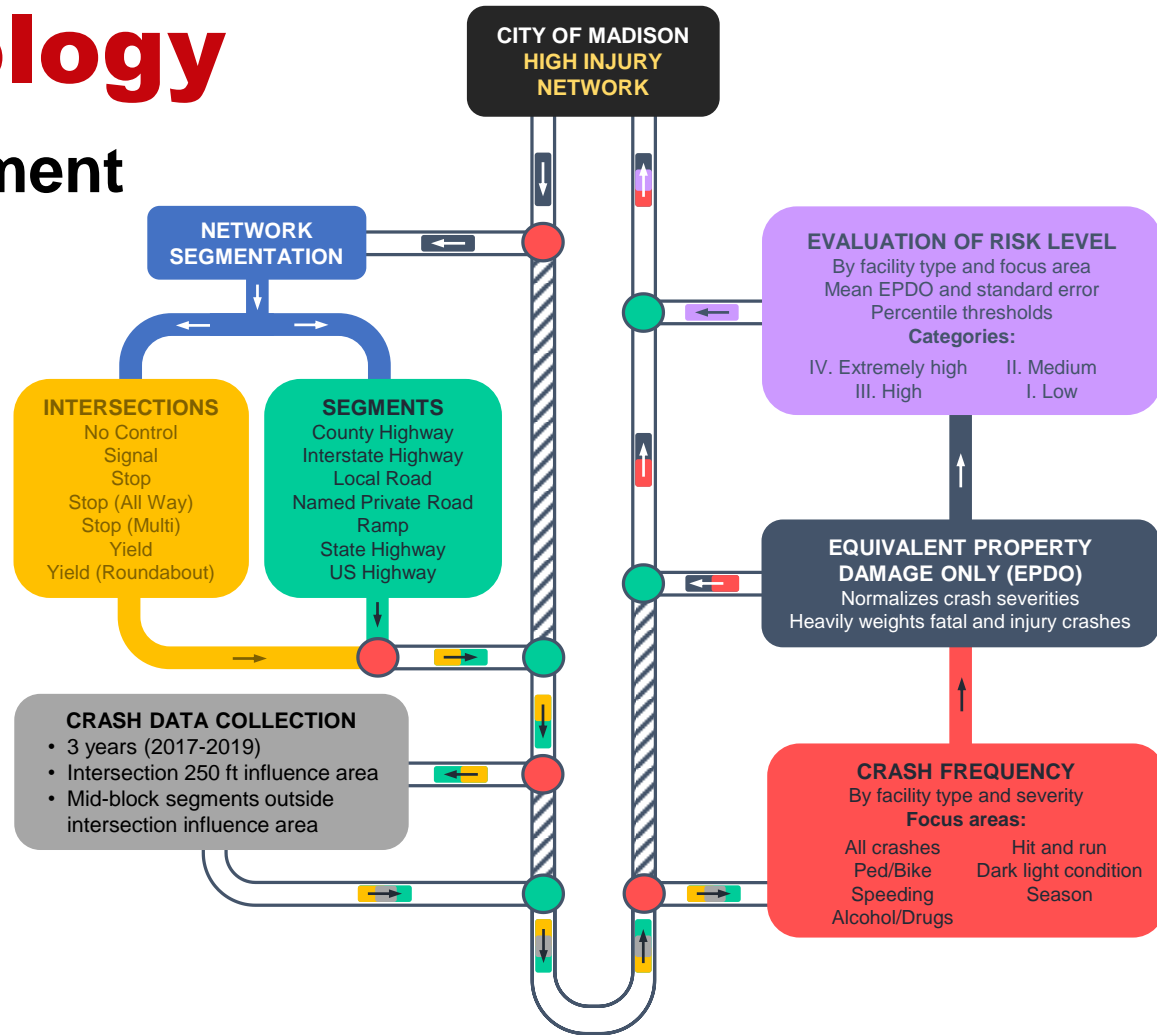
## ❖ TOPS Lab

- Developed practical and repeatable analytical process to obtain HIN
- Statistical analysis
  - Crash Frequency
  - Equivalent Property Damage Only (EPDO)



# Methodology

## ❖ HIN Development



# Methodology

## ❖ Crash Frequency

- Number of crashes over a period of analysis at a roadway facility
- Without yearly averaging (i.e., 11 crashes over three years)
- Roadway segments normalized to crashes per mile

## ❖ Equivalent Property Damage Only (EPDO)

- Safety measure that allows fatal and injury crashes (KABC) to be normalized to property damage crashes (O).
- Using crash costs, weights were estimated to determine the equivalency of KABC crashes to O crashes
- Crash costs and EPDO weights available from Madison MPO 2012-2016 research project



# Methodology

## Equivalent Property Damage Only (EPDO)

- By crash type
  - Motor vehicle-pedestrian crash (Ped)
  - Motor vehicle-bicycle crash (Bike)
  - Motor vehicle crash (Veh)

Severity		Crash Cost			EPDO Weight		
		Ped	Bike	Veh	Ped	Bike	Veh
<b>K</b>	<b>Fatal</b>	\$3,305,922	\$3,147,627	\$3,782,512	135.9	129.4	155.5
<b>A</b>	<b>Incapacitating</b>	\$433,383	\$362,759	\$389,169	17.8	14.9	16.0
<b>B</b>	<b>Non-Incapacitating</b>	\$113,100	\$90,303	\$107,674	4.7	3.7	4.4
<b>C</b>	<b>Possible Injury</b>	\$73,539	\$60,060	\$56,365	3.0	2.5	2.3
<b>O</b>	<b>Property Damage</b>	\$35,692	\$49,042	\$24,322	1.5	2.0	1.0





# Methodology

## EPDO Examples

Severity		Crash Cost			EPDO Weight		
		Ped	Bike	Veh	Ped	Bike	Veh
K	Fatal	\$3,305,922	\$3,147,627	\$3,782,512	135.9	129.4	155.5
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### EXAMPLE 1 Vehicle Crashes

1

Vehicle crash (Veh) with  
incapacitating injury (A)



=

16

Vehicle crash (Veh) with  
property damage only (O)



# Methodology

## EPDO Examples

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### EXAMPLE 2

#### Pedestrian Crashes

1

Vehicle-Pedestrian crash (Ped)  
with **fatal injury (K)**



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136

Vehicle crash (Veh) with  
**property damage only (O)**



# Methodology

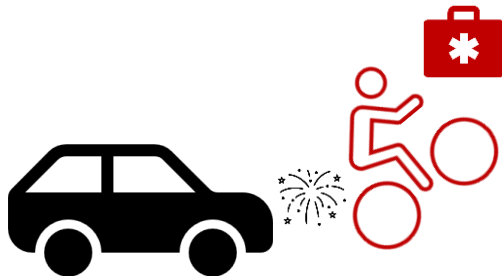
## EPDO Examples

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### EXAMPLE 3 Bicycle Crashes

1

Vehicle-Bike crash (Ped)  
with **incapacitating injury (A)**



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15

Vehicle crash (Veh) with  
**property damage only (O)**



# Methodology

## ❖ High Injury Network (HIN)

- Safety analysis of intersections and segments based on EPDO
- Locations with EPDO higher than threshold
- 65<sup>th</sup> percentile threshold
- Mapping of high injury intersections and segments
- Combination of influence area of high injury facilities

