# 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
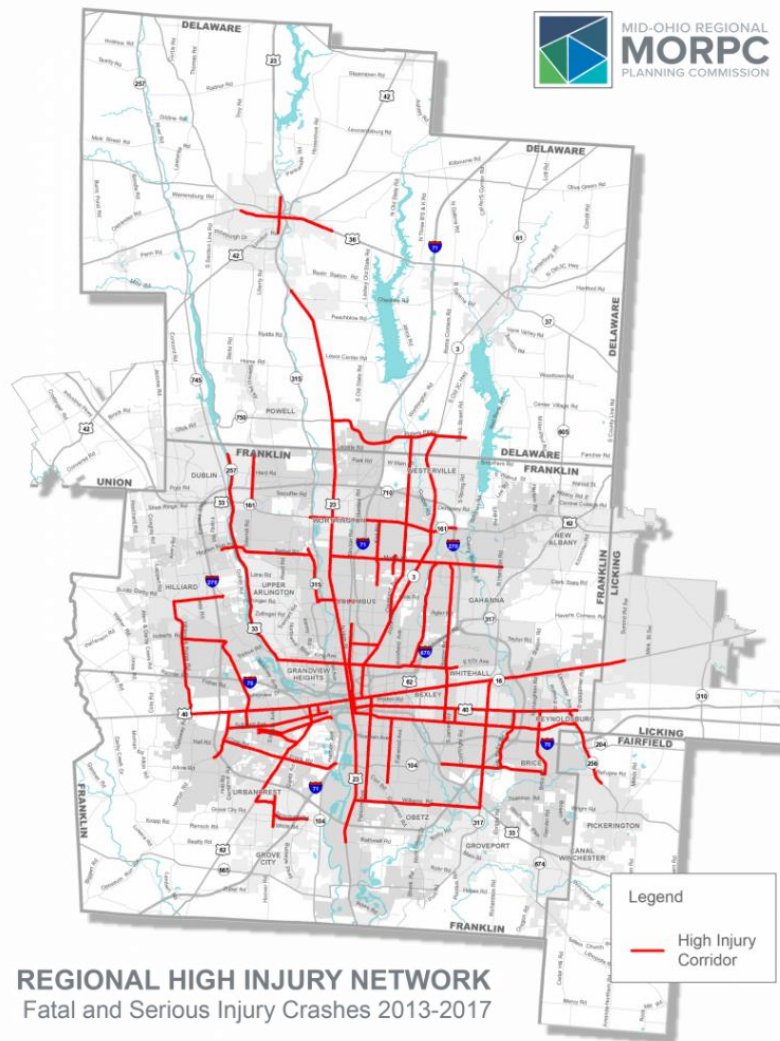- Prioritize investments

# Overview

## High Injury Network (HIN)
### City of Bellevue, WA

# Overview

## High Injury Network (HIN)
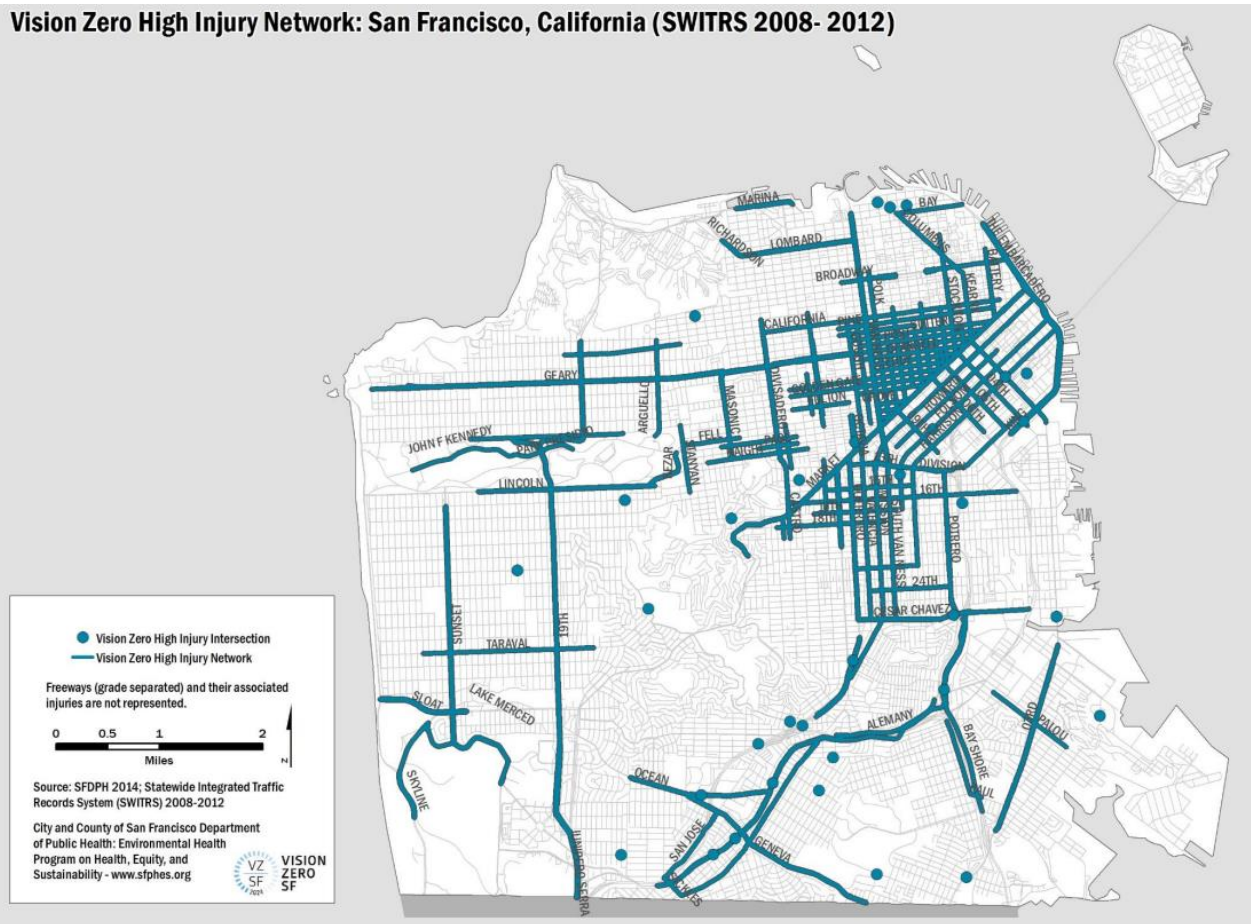**MORPC, OH**



REGIONAL HIGH INJURY NETWORK
Fatal and Serious Injury Crashes 2013-2017

# Overview

## High Injury Network (HIN)
### San Francisco, CA



Vision Zero High Injury Network: San Francisco, California (SWITRS 2008- 2012)

# 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
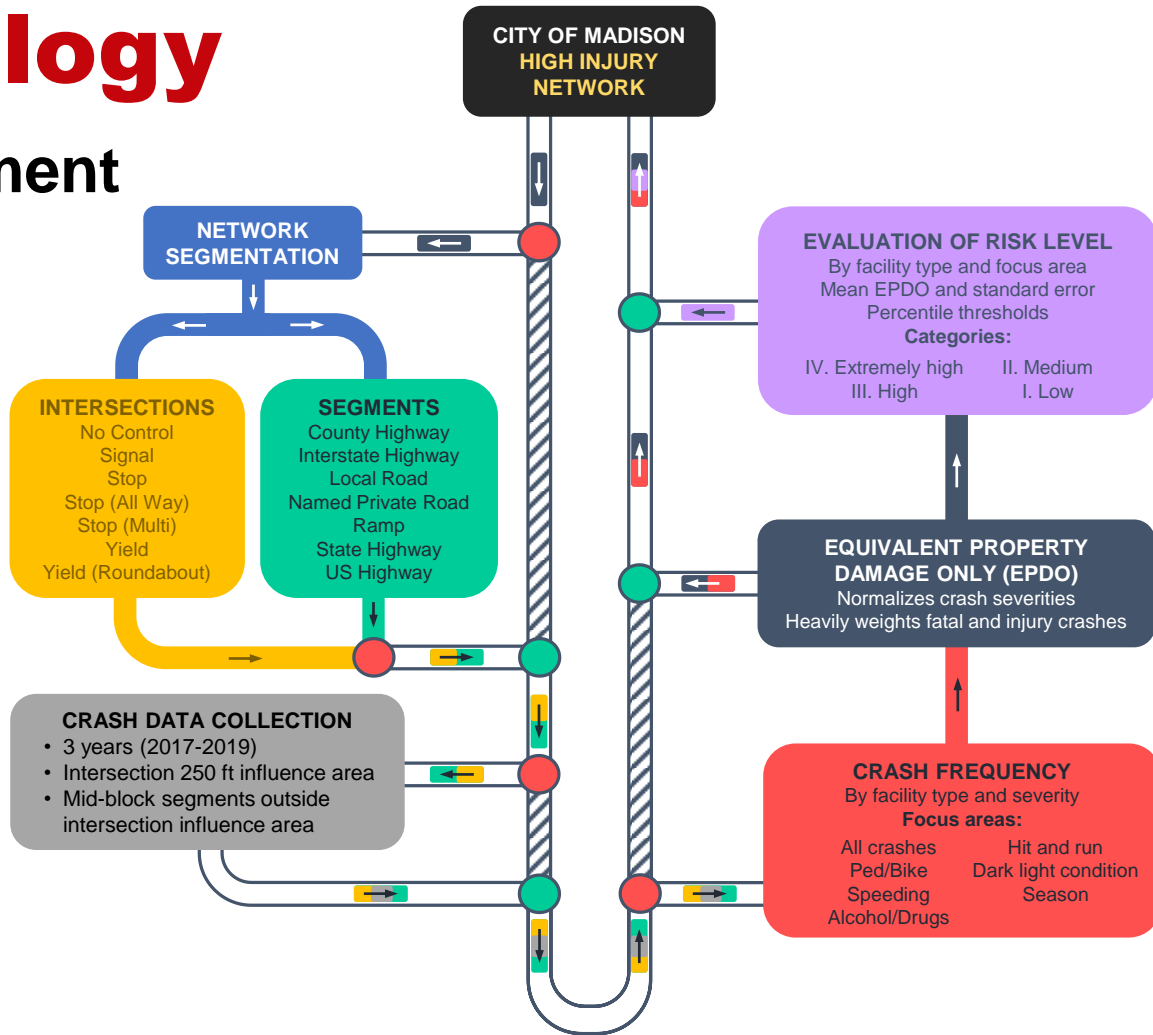
❖ **TOPS Lab**

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

# Methodology

❖ **HIN Development**

**CITY OF MADISON HIGH INJURY NETWORK**

**NETWORK SEGMENTATION**

**INTERSECTIONS**
No Control
Signal
Stop
Stop (All Way)
Stop (Multi)
Yield
Yield (Roundabout)

**SEGMENTS**
County Highway
Interstate Highway
Local Road
Named Private Road
Ramp
State Highway
US Highway

**CRASH DATA COLLECTION**
- 3 years (2017-2019)
- Intersection 250 ft influence area
- Mid-block segments outside intersection influence area

**EVALUATION OF RISK LEVEL**
By facility type and focus area
Mean EPDO and standard error
Percentile thresholds
**Categories:**

IV. Extremely high      II. Medium
III. High               I. Low

**EQUIVALENT PROPERTY DAMAGE ONLY (EPDO)**
Normalizes crash severities
Heavily weights fatal and injury crashes

**CRASH FREQUENCY**
By facility type and severity
**Focus areas:**

All crashes          Hit and run
Ped/Bike             Dark light condition
Speeding             Season
Alcohol/Drugs

# 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** |
| K | Fatal | $3,305,922 | $3,147,627 | $3,782,512 | 135.9 | 129.4 | 155.5 |
| A | Incapacitating | $433,383 | $362,759 | $389,169 | 17.8 | 14.9 | 16.0 |
| B | Non-Incapacitating | $113,100 | $90,303 | $107,674 | 4.7 | 3.7 | 4.4 |
| C | Possible Injury | $73,539 | $60,060 | $56,365 | 3.0 | 2.5 | 2.3 |
| O | Property Damage | $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

| 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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| C | Possible Injury | $73,539 | $60,060 | $56,365 | 3.0 | 2.5 | 2.3 |
| O | Property Damage | $35,692 | $49,042 | $24,322 | 1.5 | 2.0 | 1.0 |

**EXAMPLE 2**
Pedestrian Crashes

## 1

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

## 136

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

=



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# 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 |
| **A** | **Incapacitating** | $433,383 | $362,759 | $389,169 | 17.8 | 14.9 | 16.0 |
| **B** | **Non-Incapacitating** | $113,100 | $90,303 | $107,674 | 4.7 | 3.7 | 4.4 |
| **C** | **Possible Injury** | $73,539 | $60,060 | $56,365 | 3.0 | 2.5 | 2.3 |
| **O** | **Property Damage** | $35,692 | $49,042 | $24,322 | 1.5 | 2.0 | 1.0 |

**EXAMPLE 3**
Bicycle Crashes

**1**

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

**=**
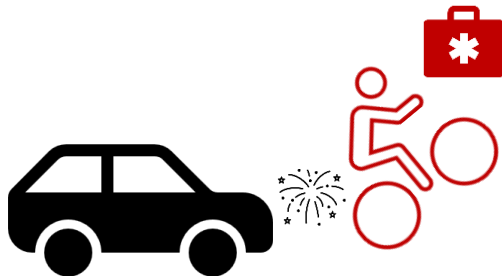
**15**

**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

- 65th percentile threshold

- Mapping of high injury intersections and segments

- Combination of influence area of high injury facilities

City of Madison
2022
High Injury Network
DRAFT

——— High Injury Network

Roadway corridors that have
had the greatest number
of crashes (2017-2019)
weighted by severity
using EPDO method

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# Questions

**David A. Noyce**
Arthur F. Hawnn Professor
danoyce@wisc.edu

**Madhav Chitturi**
Associate Researcher Scientist
madhav.chitturi@wisc.edu

**Andrea Bill**
Research Program Manager
bill@wisc.edu

**Boris Claros**
Assistant Researcher
claros@wisc.edu

**TOPS Laboratory**
**Civil and Environmental Engineering**
**University of Wisconsin – Madison**