



What Are We Walking Into? Prioritizing Pedestrian and Bicycle Projects

Derek Leuer, PE | Traffic Safety Engineer

October 23rd, 2018

Toward Zero Deaths



Agenda

Topics

Defining the Problem

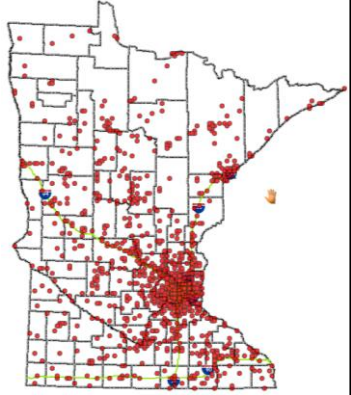
Metro Risk Assessment

Statewide Risk Assessment

Questions and Discussion

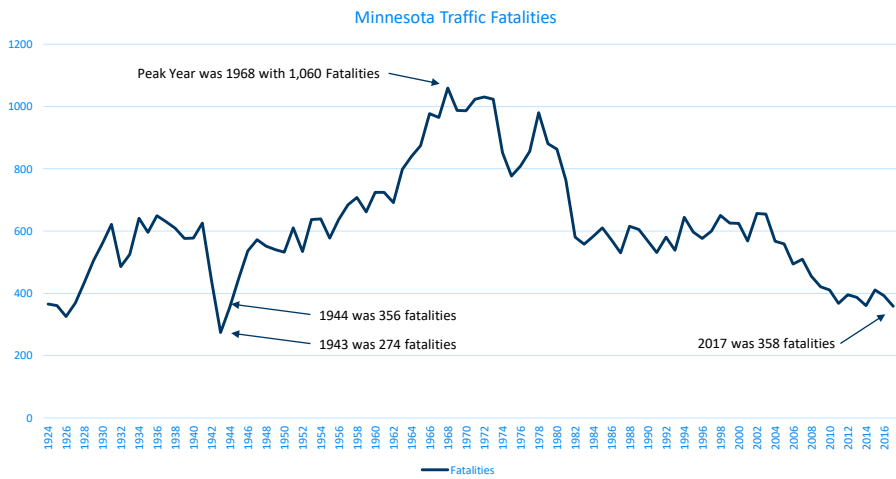
What is the Problem

- Every year 1,600 to 2,000 Pedestrians and Bicyclists are involved with Motor Vehicle Crashes
- 22 fatalities (2014) – 67 fatalities (2016)
- Average is around 50 fatalities/year
- Average about 150 serious injuries/year



11/5/2018 3

What is the Problem



Minnesota Traffic Fatalities

Peak Year was 1968 with 1,060 Fatalities

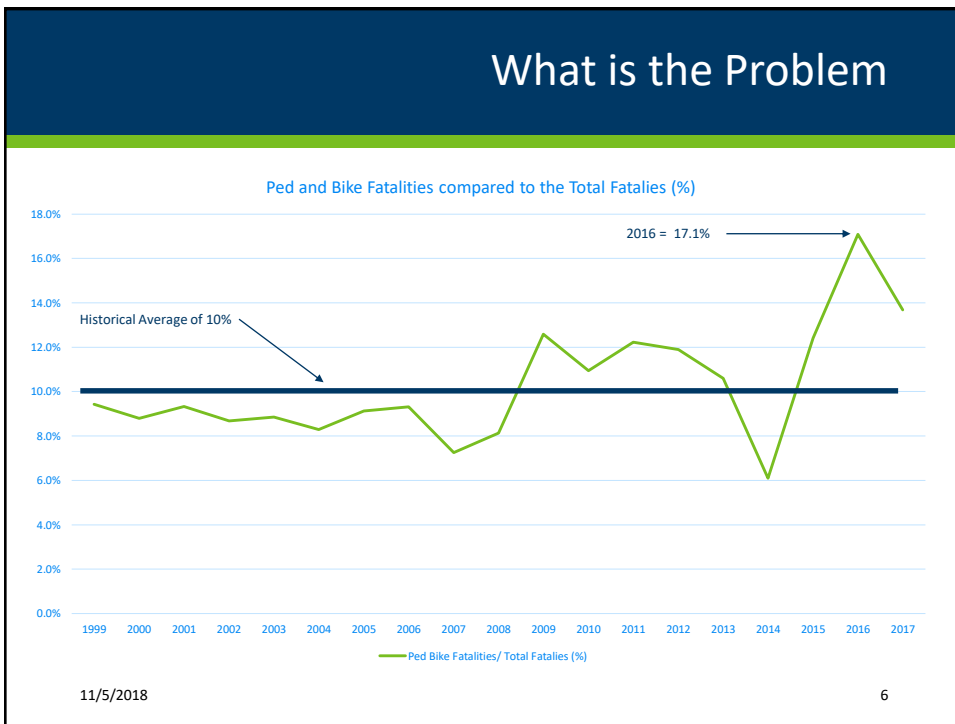
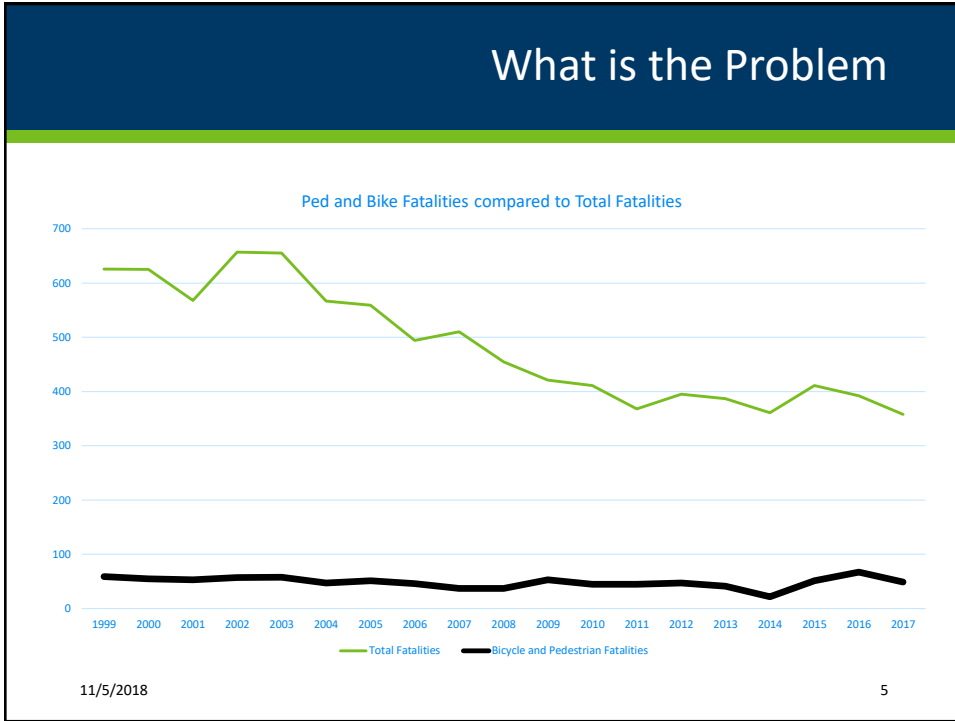
1944 was 356 fatalities

1943 was 274 fatalities

2017 was 358 fatalities

— Fatalities

11/5/2018 4



Past Solutions



- Most agencies were auto-centric
- Ped/Bike was an after thought
- Discourage Biking and Walking
- Cities built for cars, not people
- Discrimination?

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7

Unintended Consequences

- People don't walk/bike
- Discourage Biking and Walking
- Obesity Epidemic
- Asthma, heart conditions, etc.

Study Shows America's Obesity Rate At All-Time High

October 13, 2017 at 11:16 am

Filed Under: Glenn Schuck, Obesity



57 percent of American children will grow up to be obese



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8

Encourage Walking and Biking

MINNESOTA WALKS
December 2016

ship
statewide health improvement partnership

Statewide Bicycle System Plan

BIKE+WALK
MINNESOTA 2018

Minnesota **GreenStep Cities**

Google Custom Search

A program of the Minnesota Pollution Control Agency and its partners

11/5/2018 Optional Tagline Goes Here | mndot.gov/ 9

!!Colliding of the Worlds!!



- How do we mesh the two?
- How do we fund ped/bike?
- Changing a culture

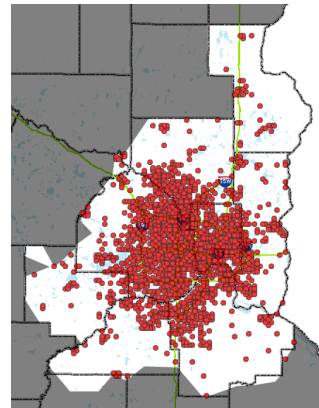


Metro Risk Assessment

Derek Leuer

What is the Problem

- Every year ~ 1,200 Pedestrians and Bicyclists are involved with Motor Vehicle Crashes
- 16 fatalities (2008) – 28 fatalities (2015)
- Average is around 22 fatalities/year
- Average about 100 serious injuries/year



Metro District Safety Plan

- This is a data driven analysis
- Goal: To identify at - risk intersections and suggest countermeasures to reduce pedestrian and bicycle related fatal and serous injury crashes
- Metro Planners knew about previous risk analysis
- Set-Aside money starting in 2017
- Fluctuates, but \$2-3 Million / Year

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13

Metro District Safety Plan

- Fund safety directly (vs system continuity)
- Lots of requests (unknown if risk was real)
- Metro wanted to lead, not react
- Expand; Preserve and Enhance
- Maximize Investment
- Mix Stand-Alone Projects and Project Enhancements
 - Pavement Program

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14

Data Summary

- Total Intersection = 5421
- 750 were evaluated
- 650 used in the final analysis
- Out of the 5421 intersections there was 2850 total crashes and 269 K+A crashes

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15

Risk Factors

Signalized Risk Factors

- Bus Stop
- Major Median
- Major Speed Limit (35-50 mph)
- Near School
- Major Left Turn Signal (Protected)
- Approach Volume (25,001-35,000)
- Location Type (Suburban)
- Approach Volume (35,001-45,000)
- No on Street Parking

Un-Signalized Risk Factors

- No on Street Parking
- Location Type (Suburban)
- Speed Limit (30 or Less mph)
- Major Through Lanes (4)
- Major Median
- Near School
- Bus Stop
- Approach Volume (35,001-45,000)
- Location Type (Urban)
- Major Speed Limit (35-50 mph)
- Street Lighting (NONE)
- Number Legs (4)

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16

Example of 5 Star Intersection

TH 5 (7th St. W) and St. Paul Ave



Signalized Risk Factors

- ★ • Bus Stop
- Major Median
- ★ • Major Speed Limit (35-50 mph)
- Near School
- ★ • Major Left Turn Signal (Protected)
- ★ • Approach Volume (25,001-35,000)
- Location Type (Suburban)
- Approach Volume (35,001-45,000)
- ★ • No on Street Parking

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17

Countermeasures

Signalized Counter measures:

1. Confirmation Lights

Signalized Bus Stop Countermeasure:

1. Reduce Signal Cycle Length
2. Pedestrian Priority
3. Put Pedestrian Phase on Recall
4. Move Bus Stops to Far Side
5. Countdown Timers

Signalized Major Median and Approach Volume Countermeasure:

1. Increase pedestrian Phase Length
2. Reduce Signal Cycle Length
3. Pedestrian Priority
4. Put Pedestrian Phase on Recall

Un-signalized Countermeasure:

1. Raised Crossing
2. In Street Pedestrian Signs
3. Median Refuge Island
4. RRFB (Rectangular Rapid Flash Beacon)
5. HAWK
6. Curb Extension

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18

2016 District Safety Plans Update

| | Minimum | Maximum |
|--|--------------------------|-----------|
| Urban Segments | | |
| ADT | 9000 | Unlimited |
| Road Geometry | Multi-Lane (4+) | |
| Access Density | 36 | Unlimited |
| Speed Limit | 35 | 45 |
| Primary Land Use | Urban or Suburban Retail | |
| Severe HO + RE + SSP + SSO Crash History | 0.019 | |
| Urban Intersections - Right Angle | | |
| Cross Product | 3000000 | Unlimited |
| Traffic Control | Signal | |
| Major Corridor Speed | 40 | Unlimited |
| Skew | 5 | Unlimited |
| Adjacent Curve | Present | |
| Primary Land Use | Urban or Suburban Retail | |
| Severe Right Angle Crash History | 0.006 | |
| Urban Intersections - Ped/Bike | | |
| Cross Product | 3000000 | Unlimited |
| Traffic Control | Signal | |
| Major Corridor Speed | 35 | Unlimited |
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19

2016 District Safety Plans Update

| | Minimum | Maximum |
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| Urban Segments | | |
| ADT | 9000 | Unlimited |
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| Major Corridor Speed | 40 | Unlimited |
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| Severe Ped/Bike Crash History | 0.001 | |

Metro Signalized Intersection Risk Factors

- Bus Stop
- Major Median
- Major Speed Limit (35-50 mph)
- Near School
- Major Left Turn Signal (Protected)
- Approach Volume (25,001-35,000)
- Location Type (Suburban)
- Approach Volume (35,001-45,000)
- No on Street Parking

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20

2016 District Safety Plans Update

US 53 and 13th Street, Virginia, MN

Risk Factors Present



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- ★ • Cross Product
 - Major = 14,900
 - Minor = 2,600
 - Cross Product = 39 Million
- ★ • Traffic Control Device (Signal)
- ★ • Major Corridor Speed (45 MPH)
- ★ • Skew (15 degrees)
- ★ • On/Near Horizontal Curve (Yes)
- ★ • Primary Land Use Type (Retail/Suburban)
- ★ • Severe Crash Density

21

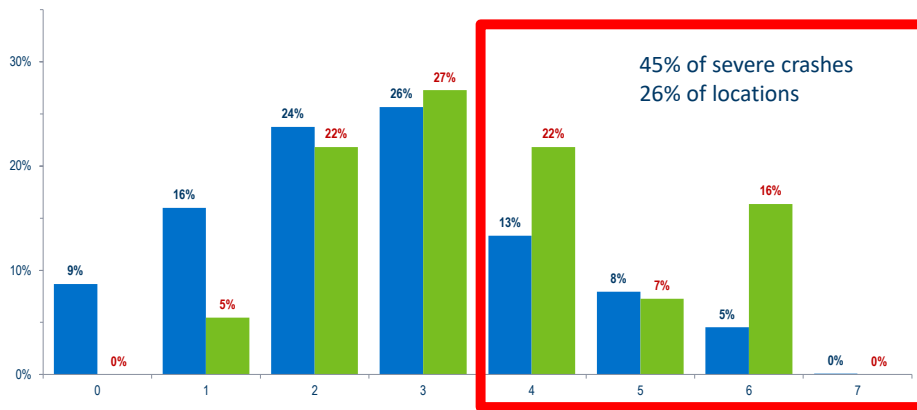
• (1 severe ped/bike crash 2009-2013)

2016 District Safety Plans Update

DSP Intersection Risk Rating

2014-2015 Fatal and Serious Injury Crashes

■ Intersections ■ Bike-Ped K+A Crashes



45% of severe crashes
26% of locations

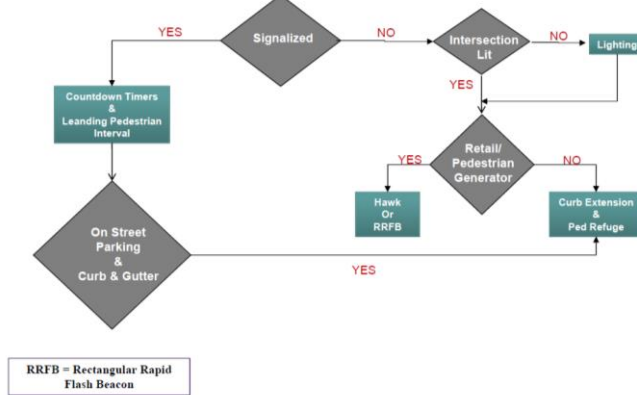
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26% of the intersections had 45% of the crashes!

22

2016 District Safety Plans Update

Urban Intersections at Risk Ped/Bike Crashes



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*Over 300 intersections had some type of project selected and assigned!

23

2016 District Safety Plans Update

District 1
Urban Intersections - Ped/Bike Project List

| Intersection ID | Route Designation | Route No. | Description | Reference Page | Star Rating | Contributor | Project | HSIP | RRFB | RRFB | Curb Extension | Median Safety | Lighting | Project Cost |
|-----------------|-------------------|-----------|----------------------|----------------|-------------|-------------|---------|------|------|------|----------------|---------------|----------|--------------|
| 1-1001-001 | 101 | 53 | 200TH AV & 100TH AVE | 001-001-001 | ***** | 1 | | | | | | | | \$10,000 |
| 1-1001-002 | 101 | 53 | 200TH AV & 100TH AVE | 001-001-002 | ***** | 1 | | | | | | | | \$10,000 |
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| 1-1001-050 | 101 | 53 | 200TH AV & 100TH AVE | 001-001-050 | ***** | 1 | | | | | | | | \$10,000 |

Submitted Projects

- 20 Intersections
- Pedestrian Countdown Timers
- All 4 stars and above
- \$240,000 in HSIP

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24

A Selection of Treatments

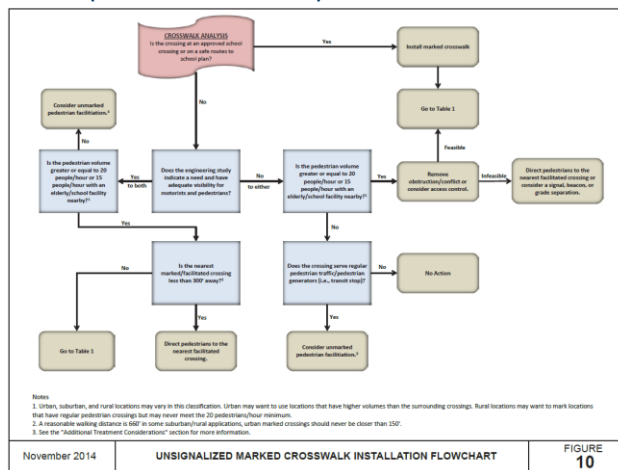
- Warning signs
- Medians
- Curb Extensions
- Road Diets
- Reducing Corner Radii
- Advanced Stop Lines
- Raised Crosswalks
- In-Roadway Lights
- Pedestrian Hybrid Beacons
- Pedestrian Signals
- Grade Separation
- Striped Channelized Right Turns
- Blank-Out No Right Turn on Red Signs
- Lighting
- Gateway Treatment

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25

Crosswalk Marking Placement

- Our Flowchart (See MnDOT TEM)



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November 2014

UNSIGNALIZED MARKED CROSSWALK INSTALLATION FLOWCHART

FIGURE 10

26

Crosswalk Marking Placement

- Our table**** (See MnDOT TEM)
 - Developed based on Zegeer study and other national studies for additional treatments (Virginia, Colorado, Washington, etc.).

Table 13-1 Pedestrian Facility Treatments

| Roadway Configuration ^{1,2} | Vehicle ADT < 2000 | | | | Vehicle ADT 2,001 - 10,000 | | | | Vehicle ADT 10,001 - 50,000 | | | | Vehicle ADT > 50,000 | | | |
|--|--------------------|--------|--------|----------|----------------------------|--------|--------|----------|-----------------------------|--------|--------|----------|----------------------|--------|--------|----------|
| | < 30 mph | 30 mph | 40 mph | > 45 mph | < 30 mph | 30 mph | 40 mph | > 45 mph | < 30 mph | 30 mph | 40 mph | > 45 mph | < 30 mph | 30 mph | 40 mph | > 45 mph |
| 1. One (with or without a raised median) | A | A | B | D | A | A | B | D | A | A | C | D | A | B | C | D |
| 2. One with raised median | A | A | C | D | A | B | C | D | A | C | C | D | B | C | C | D |
| 3. One without raised median | A | B | C | D | A | B | C | D | B | B | C | D | B | C | C | D |
| 4. Multiple (4 or more lanes) with raised median ³ | A | A | C | D | A | B | C | D | A | B | C | D | C | C | C | D |
| 5. Multiple (4 or more lanes) without raised median ³ | A | C | C | D | B | C | C | D | C | C | C | D | C | C | C | D |

Treatment Considerations:

A. Consider marked crosswalk and signs.
 Guidance: Consider installing marked crosswalks with advance warning signs (W12-12), use T1-2 signs for school crossings. Consider in-roadway (R2-6) or overhead (R2-9b) signs.

B. Consider marked crosswalk with enhanced signs (R5 or R5-9b) and/or geometric improvements.
 Guidance: Consider installing treatment options from Type A treatments. Add curb extensions or median refuge islands.

C. Consider marked crosswalk with signs, geometric improvements, and pedestrian-actuated warning devices⁴.
 Guidance: Consider installing a raised median refuge island if one is not present. Consider installing marked crosswalk and appropriate crossing signs along with a pedestrian-actuated device.

D. Do not install marked crosswalks.⁵
 Guidance: Consider pedestrian hybrid beacons, pedestrian traffic signal, or grade-separated crossing.

Special Notes:

- Advanced stop lines and signing (R5-9b or C) should be used whenever possible if a multiple threat crash issue is present. Overhead signing, W19s or other overhead treatments should be used to mitigate multiple threat crash risks.
- Do not install a marked crosswalk where there are 3 or more through lanes per direction. Consider a pedestrian hybrid beacon, pedestrian traffic signal, or grade-separated crossing.
- Traffic calming treatments should be considered to reduce speed.
- If a median LaneMark bar or is not currently installed go to Treatment Type D.
- Minimum acceptable median width to provide a refuge is 8 feet.

General Notes:

- Adding crosswalks alone will not make crossings safer, result in more vehicles stopping for pedestrians, nor will they necessarily create a false sense of security.
- Crosswalks have not been proven to create a false sense of security – research shows that pedestrians can be confident about marked crosswalks.
- Whether a crosswalk is marked or not, additional crossing enhancements should be considered. See the "Additional Treatment Considerations" section.
- See MnDOT Section 85.28 for additional guidance on using this table.
- Lanes are total cross section.

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27

What Else?

- Emergency vehicles – blink across in a row. How about up the pole?
- What else catches your eye?
- Balance between attention and distraction



28



The End!

Questions? Discussions?

Derek Leuer