Rural and Local Road Safety Towards Zero Deaths Approach

Brad Estochen
State Traffic Safety Engineer
Minnesota Department of Transportation
On an average day in Minnesota*...

- 200+ total crashes
- 85 injuries - 4 people seriously injured
- 1 person dies in a traffic crash

The economic loss to MN
$1.5 billion annually

* Based on 2013 data
Towards Zero Deaths

- Reduce fatalities and serious injuries to 0

- How?
  - Utilize data to drive decisions
  - Be proactive and systemic
  - Partner with other disciplines
  - Develop a plan
  - Leverage the plan to drive funding decisions
Focus is on Fatal and Serious Injury Crashes

- Black spots are infrequent on rural/local roads
- Fatal and Severe injury crashes are random on rural/local roads

County Roads
- 2,089 Severe Crashes
- 45,000 miles of road
- 0.05 severe crash/mile

Trunk Highway
- 2,168 Severe Crashes
- 12,000 miles of road
- 0.18 severe crashes/mile
All Crashes in Minnesota 2013
Serious Crashes in Minnesota 2013
Local Road Serious Crashes 2013
Overview of Safety Project Development Process

- Reactive Approach – Location with crash rate above the critical crash rate and/or experienced multiple severe crashes in the 5-year study period.
- The Systemic Approach – Applying high benefit/low cost safety strategies at the at-risk locations across the system of highways.

**The key questions:**
- Is every element of the system equally at risk?
- Where to Start?

**A new approach to safety planning**

**Old Approach**
Crashes = Risk  No Crashes = No Risk

**New Approach**
No Crashes ≠ No Risk
Use surrogates instead of crashes to determine risk
Severe crash involves a fatality or serious injury
Greater MN County Crash Data Overview

Example

All – %
Severe – %

Urban
14,354 – 38%
355 – 17%

CSAH/CR
38,094 – 24%
2,089 – 13%

Rural
23,740 – 62%
1,734 – 83%

Animal
4,226 – 18%
72 – 4%

Not Animal
19,514 – 82%
1,662 – 96%

Inters-Related
5,752 – 30%
469 – 28%

Not Inters-Related
12,384 – 63%
1,127 – 68%

Other/Unknown
1,946 – 26%
49 – 31%

All Way Stop
218 – 4%
4 – 1%

Thru-Stop
228 – 46%
49 – 49%

Run Off Road
1,223 (23%), 68 (39%)

Head On
364 (7%), 22 (13%)

Rear End
1,348 (26%), 18 (10%)

Right Angle
520 (10%), 12 (7%)

Other/Unknown
2,712 – 47%
218 – 46%

Signalized
218 – 4%
4 – 1%

Run Off Road
1,057 (39%), 89 (41%)

Right Angle
288 (11%), 41 (19%)

Left Turn
168 (6%), 17 (8%)

Rear End
372 (14%), 5 (2%)

Head On, SS Opp
800 – 7%
135 – 12%

On Curve
291 – 36%
50 – 37%

Run off Road
8,204 – 66%
734 – 65%

Right Angle
907 (34%), 126 (55%)

Run Off Road
351 (13%), 21 (9%)

Left Turn
188 (7%), 9 (4%)

Rear End
285 (11%), 7 (3%)

Unknown/Other
1,719 – 12%
20 – 5%

Not Inters-Related
5,228 – 36%
176 – 50%

Unknown/Other
7,407 – 52%
159 – 45%

Source: MnCMAT Crash Data, 2005-2009

Severe is fatal and serious injury crashes (K+A).
Surrogates

- Heart Disease
  - Smoking
  - Obesity
  - Cholesterol
  - Blood pressure
  - Physical activity
  - Stress
  - Age/sex/heredity

- Surrogates for severe crashes?
  - Segments, Intersection, Curves...
Surrogate Measures for Rural Thru STOP Intersections

- **Geometry**
  - Skewed minor leg approach
  - Intersection on horizontal curve

- **Volume**
  - Minor /Major volume ratio

- **Proximity**
  - Previous STOP sign
  - Railroad crossing

- **Crash History**

- **Commercial Development in quadrants**
Curve-Related Roadway Departure

- Curve Surrogates
  - Traffic Volume Range
  - Radius Range
  - Severe crash on curve
  - Intersection on curve
  - Visual Trip on curve

The majority of severe crashes occurred on curves with 500’-1,500’ radii.
Screening - Initial Strategies

AASHTO’s SHSP, NCHRP Report 500 Implementation Guidelines, and input from Safety Partners.

The strategies will be screened using:
- Crash data,
- Effectiveness,
- Cost, and
- Input from Safety Workshop.

The selected Critical Strategies should have the greatest potential to significantly reduce the number of traffic fatalities in that specific County.
Example – Typical Lane Departure Strategies

Key Objectives:
Keep Vehicles in Their Lane

Key Strategies:
- Improved curve delineation
- Improved lane markings

Key Objectives:
Improve Shoulders

Key Strategies:
- Safety edge
- Paved shoulders
- Shoulder rumble strips
Example – Typical Intersection Strategies

Included Strategies:

- Change Intersection Type
- Directional Median
- Enhanced Signing and Delineation
- Street Lighting
- Dynamic Warning Signs
Restricted Crossing U-Turn

Indirect Turns
Foundation of Traffic Safety

- Commercial Vehicles
- Impaired Driving
- Seat Belt Laws
- Cell phone use
- Pedestrians
- Older Drivers
- Younger Drivers
- Bicycles
- EMS and Trauma Service
Recap

- Black spots for severe crashes are rare
- Low Cost Systemic Improvements
- Use risk as a proxy for crashes
- Balance reaction with prevention of safety solutions
- Engineering is only part of the solution