Low Cost Safety Improvements

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Wisconsin Tribal Transportation Conference
Green Bay, WI

October 30, 2019
WisDOT Regional Boundaries
Traffic Safety Commission meetings

• Focuses on the 4 E’s
  ▪ Engineering
  ▪ Education
  ▪ Enforcement
  ▪ Emergency Response

• Meetings held quarterly
  ▪ Reviews operational/safety issues
  ▪ Reviews fatal and serious injury crashes
ANATOMY OF BROWN COUNTY:
A TRAFFIC SAFETY SUMMARY
FIGURE 4: POPULATION OF BROWN COUNTY MUNICIPALITIES (2016)

City of Green Bay, 105,139
City of De Pere, 24,893
Village of Wrightstown, 3,179
Village of Suamico, 12,588
Village of Pulaski, 3,330
Village of Howard, 19,410
Village of Hobart, 8,599
Village of Denmark, 2,210
Village of Bellevue, 15,524
Village of Ashwaubenon, 17,274
Village of Allouez, 13,896
Town of Wrightstown, 2,294
Town of Scott, 3,738
Town of Rockland, 1,822
Town of Pittsfield, 2,731
Town of Eaton, 1,591
Town of Glenmore, 1,139
Town of Green Bay, 2,104
Town of Holland, 7,813
Town of Lawrence, 5,037
Town of Ledgeview, 7,813
Town of Morrison, 1,610
Town of New Denmark, 1,571
ISSUE AREA: REDUCE ALCOHOL & DRUG-IMPAIRED DRIVING

FIGURE 25: ALCOHOL OR DRUG-RELATED CRASHES BY LOCATION, 2012-2016

<table>
<thead>
<tr>
<th></th>
<th>Alcohol or Drug-Related Fatal Crashes</th>
<th>Alcohol or Drug Related Non-Fatal Injury Crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interstate Highways</td>
<td>3.0%</td>
<td>1.9%</td>
</tr>
<tr>
<td>US/State Highways</td>
<td>42.4%</td>
<td>31.7%</td>
</tr>
<tr>
<td>County Highways</td>
<td>12.1%</td>
<td>7.4%</td>
</tr>
<tr>
<td>Local Roads</td>
<td>42.4%</td>
<td>59.0%</td>
</tr>
</tbody>
</table>

The most common location for alcohol/drug-related fatal crashes in Brown County is on US/state highways and local roads.

FIGURE 26: IMPAIRED DRIVING STATISTICS IN BROWN COUNTY, 2012-2016

<table>
<thead>
<tr>
<th>Average Total Fatal Crashes</th>
<th>Average Non-Fatal Injury Crashes</th>
<th>Average Alcohol or Drug-Related Fatal Crashes</th>
<th>Average Alcohol or Drug Related Non-Fatal Injury Crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.4</td>
<td>1,032.8</td>
<td>6.6</td>
<td>95.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Brown County</th>
<th>% of alcohol or drug related fatal crashes to all fatal crashes</th>
<th>57.9%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wisconsin</td>
<td>% of alcohol or drug related fatal crashes to all fatal crashes</td>
<td>45.0%</td>
</tr>
</tbody>
</table>

Brown County has a greater percentage of alcohol or drug related fatal crashes than the state of Wisconsin.
Wisconsin Fatal Crashes by Road System

- State Highway, 41%
- County Highway, 23%
- Local Street/Road, 30%
- Interstate, 6%

Source: Wisconsin DOT
Countermeasures Process

• Low cost improvements
  ▪ Signing and marking
  ▪ Tree clearing / Vision improvements
  ▪ Hazard removals

• High cost improvements
  ▪ Intersection reconstruction/reconfiguration
  ▪ Real estate acquisition
  ▪ Grade separation (overpasses / interchanges)
How many people are in this photo?
Signing Improvements

• Retroreflectivity of signing
  ▪ Manual on Uniform Traffic Control Devices (MUTCD) requirement
  ▪ Signs need to be legible during day and night conditions

20+ years old                8-12 years old          0-3 years old
MUTCD Retroreflectivity Requirements

• ...[Signs] shall be retroreflective or illuminated to show the same shape and similar color by both day and night

<table>
<thead>
<tr>
<th>Posted or 85th Percentile Speed</th>
<th>Minimum Visibility Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 MPH</td>
<td>280</td>
</tr>
<tr>
<td>30 MPH</td>
<td>335</td>
</tr>
<tr>
<td>35 MPH</td>
<td>390</td>
</tr>
<tr>
<td>40 MPH</td>
<td>445</td>
</tr>
<tr>
<td>45 MPH</td>
<td>500</td>
</tr>
<tr>
<td>50 MPH</td>
<td>555</td>
</tr>
<tr>
<td>55 MPH</td>
<td>610</td>
</tr>
<tr>
<td>60 MPH</td>
<td>665</td>
</tr>
<tr>
<td>65 MPH</td>
<td>720</td>
</tr>
</tbody>
</table>
Retroreflectivity Day vs Night

Engineer Grade Beaded  High Intensity Prismatic
Sign Sheeting

- Street sign with an arrow pointing up.
- Pedestrian crossing sign.
- Orange diamond sign reading "Right Lane Closed Ahead".
- Red octagon sign with "STOP".
- White sign with "SPEED LIMIT 70".
Diamond Grade (Fluorescent) vs High Prismatic
Retroreflective Strips
## Warning signs

- **Warranting criteria**

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<tr>
<td>65 MPH</td>
<td>720</td>
</tr>
</tbody>
</table>
## Warning sign placements

- **Warning sign placement**

### Table 2C-4. Guidelines for Advance Placement of Warning Signs

<table>
<thead>
<tr>
<th>Posted or 85th-Percentile Speed</th>
<th>Condition A: Speed reduction and lane changing in heavy traffic&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Condition B: Deceleration to the listed advisory speed (mph) for the condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0&lt;sup&gt;3&lt;/sup&gt;</td>
<td>10&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td>20 mph</td>
<td>225 ft</td>
<td>100 ft&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>25 mph</td>
<td>325 ft</td>
<td>100 ft&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>30 mph</td>
<td>460 ft</td>
<td>100 ft&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>35 mph</td>
<td>565 ft</td>
<td>100 ft&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>40 mph</td>
<td>670 ft</td>
<td>125 ft&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>45 mph</td>
<td>775 ft</td>
<td>175 ft&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>50 mph</td>
<td>885 ft</td>
<td>250 ft&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>55 mph</td>
<td>990 ft</td>
<td>325 ft&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>60 mph</td>
<td>1,100 ft</td>
<td>400 ft&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>65 mph</td>
<td>1,200 ft</td>
<td>475 ft&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>70 mph</td>
<td>1,250 ft</td>
<td>550 ft&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>75 mph</td>
<td>1,350 ft</td>
<td>650 ft&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
</tbody>
</table>
Which way does the road go?
• Simple Improvements
  ▪ Curve Warning Sign
  ▪ Night Arrow Warning Sign
  ▪ Chevrons
Curve Requirements

- Curve Signs
- Advisory Speeds
- Night Arrows
- Chevrons

Table 2C-5. Horizontal Alignment Sign Selection

<table>
<thead>
<tr>
<th>Type of Horizontal Alignment Sign</th>
<th>Difference Between Speed Limit and Advisory Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5 mph 10 mph 15 mph 20 mph 25 mph or more</td>
</tr>
<tr>
<td>Turn (W1-1), Curve (W1-2), Reverse Turn (W1-3), Reverse Curve (W1-4), Winding Road (W1-5), and Combination Horizontal Alignment/Intersection (W10-1) (see Section 2C.07 to determine which sign to use)</td>
<td>Recommended Required Required Required Required</td>
</tr>
<tr>
<td>Advisory Speed Plaque (W13-1P)</td>
<td>Recommended Required Required Required Required</td>
</tr>
<tr>
<td>Chevrons (W1-6) and/or One Direction Large Arrow (W1-6)</td>
<td>Optional Recommended Required Required Required</td>
</tr>
<tr>
<td>Exit Speed (W13-2) and Ramp Speed (W13-3) on exit ramp</td>
<td>Optional Optional Recommended Required Required</td>
</tr>
</tbody>
</table>
Is it a curve or turn?

How do you know whether to use a turn arrow or curve arrow?
Pedestrian Improvements

• Crosswalk Markings
• Pedestrian Signing
Crosswalks

• Crosswalk markings
  ▪ Mark where conflicts exist between vehicles/pedestrians
  ▪ Provides visual for the driver where they may expect pedestrians

Figure 3B-16. Examples of Crosswalk Markings

Spacing of lines selected to avoid wheel path
Pedestrian Signing

• Pedestrian Signs
  ▪ Pedestrian Warning Signs
  ▪ In-Street Pedestrian Signs
  ▪ Beacons
  ▪ LED blinker signs
  ▪ Rapid Rectangular Flashing Beacons (RRFB)
Countermeasure Process

• Low cost improvements
  ▪ Signing and marking
  ▪ Tree clearing / Vision improvements
  ▪ Hazard removals
FATAL CRASHES → 56% Roadway Departure → 40% Fixed Object Collision → 63% Tree or Pole
Roadside Design Improvements at Curves

*Increasing the Clear Zone prevents crashes*

- **27%** of all fatal crashes occur at curves
- **80%** of all fatal crashes at curves are roadway departure crashes

*Source: Fatality Analysis Reporting System (FARS)*
Vision Triangle / Intersection Sight Distance

Clear Sight Triangle Looking Left

Clear Sight Triangle Looking Right

Location of Driver’s Eye (Use 15 feet from edge of nearest through lane)
SafetyEdge® technology shapes the edge of the pavement at approximately 30 degrees from the pavement cross slope during the paving process. This systemic safety treatment eliminates the vertical drop-off at the pavement edge, allowing drifting vehicles to return to the pavement safely. It has minimal effect on asphalt pavement project cost with the potential to improve pavement life.

Vehicles may leave the roadway for various reasons, ranging from distracted driver errors to low visibility, or to the presence of an animal on the road. Exposed vertical pavement edges can cause vehicles to be unstable and prevent their safe return to the roadway. SafetyEdge® gives drivers the opportunity to return to the roadway while maintaining control of their vehicles.

For both SafetyEdge® and traditional edge, agencies should bring the adjacent shoulder or slope flush with the top of the pavement. Since over time the edge may become exposed due to settling, erosion, and tire wear, the gentler slope provided by SafetyEdge® is preferred versus the traditional vertical pavement edge.

Transportation agencies should develop standards for implementing SafetyEdge® on all new asphalt paving and resurfacing projects where curbs are not present, while encouraging standard application for concrete pavements.

- **11%**
  - Reduction in fatal and injury crashes

- **2 to 4 times**
  - More likely to include a fatality than other crashes on similar roads

- **500-1400**
  - Calculated benefit-cost ratios typically range between

For more information on this and other FHWA Proven Safety Countermeasures, please visit [https://safety.fhwa.dot.gov/provenscountermeasures](https://safety.fhwa.dot.gov/provenscountermeasures)
Questions?

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