Roundabouts – An Update on the Local Operational Experience

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Cheesehead Perspectives

• Wi and River Falls RAB History
• RAB Accident Experience
• Pedestrians vs RAB’s
• Sight Distance
• Design Considerations
  – Signage, Lighting, Curbs
• Maintenance
WISCONSIN AND RIVER FALLS ROUNDABOUT HISTORY
Wisconsin RAB’s (2013)

• Statewide
  – 193 roundabouts on the state highways
  – 75 +/- on local roads
  – 300+ by end of 2015
River Falls RAB’s

- **River Falls**
  - 4 roundabouts currently operating
    - 1 State Multi-Lane RAB (2010)
    - 3 City Single-Lane RAB’s (2006) (2-2012)
  - 3 multi-lane roundabouts opening in 2014
    - 2 State, 1 City
  - 10 signalized intersections
    - 1 State, 9 City
    - Latest constructed in 2012 and 2010
ROUNDABOUT ACCIDENT EXPERIENCE
Wisconsin RAB Accidents

The UW-Madison Traffic Operations & Safety Lab (TOPS)

• before-after safety analysis of 24 roundabouts constructed between 2004 & 2007 in Wisconsin.

• Data - 3 years before/after RAB Install

• Crash data during construction omitted
Results.

- no fatal accidents
- injury-fatal crashes reduced 52%
- all crashes reduced by 9%
### 24 RAB Intersections (built 2004-2007)

<table>
<thead>
<tr>
<th>Case Description</th>
<th>Before (3 yr)</th>
<th>After (3 yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatal</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Incapacitating crashes</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Non-Incapacitating crashes:</td>
<td>26</td>
<td>11</td>
</tr>
<tr>
<td>Possible Injury crashes:</td>
<td>47</td>
<td>26</td>
</tr>
<tr>
<td>Total Fatal/Injury</td>
<td>80</td>
<td>41</td>
</tr>
<tr>
<td>Property Damage Only</td>
<td>149</td>
<td>221</td>
</tr>
<tr>
<td>Total</td>
<td>229</td>
<td>262</td>
</tr>
</tbody>
</table>
How Does $+14\% = -9\%$

- Study reports all crashes reduced by 9%.
- Data shows 229 accidents before and 262 after, an apparent 14 increase?
- Is this Wisconsin Math?
+14% **Does** = -9%

- Empirical Bayes analysis
- Recommended by the FHWA
- Considers changes in AADT
River Falls RAB Accidents

- Cemetery Rd/Wasson Ln (2006)
  - 3.0 Accidents/Yr (2003-2005)
  - 1.3 Accidents/Yr (2007-2012)

- Cascade Av/Second St (2012)
  - 1.3 Accidents/Yr (2003-2008)
  - 1 Accident (2013)

- Cascade Av/Sixth St (2012)
  - 1.7 Accidents/Yr (2003-2008)
  - 2 Accidents (2013)
PEDESTRIANS VS ROUNDABOUTS
Pedestrians vs. RAB

• “The cars that are travelling on Cascade and especially through the roundabout are many times going 10-15 mph over the posted speed limit for the roundabout, which I think was listed as 15mph. I don’t know what the city or university can do to ensure that pedestrians are safer.”
Ensure
to make sure, certain, or safe : guarantee
Pedestrians vs. RAB’s

• A RAB’s **cannot** ensure that a Pedestrian is safe

• A RAB **can** generally **ensure** pedestrians are provided with more opportunity to be safe
25mph x 15 sec. = 550

2 Directions to Check

15 sec. +/- Crossing Time
Left turning vehicle sees same opportunity as Pedestrian

15 sec. +/- Crossing Time
Safe Pedestrians

• A pedestrian should be defensive and practice the following at any crosswalk:
  – Don't assume motorists see you or are going to yield to you.
  – Step off curb and cautiously wait near curb for motorists to yield.
  – Confirm motorists have yielded to you.
  – Look at the driver's eyes and be certain they see you before you step in front of the car.
Pedestrian vs. RAB

• The design of the road cannot in itself “ensure safety” for pedestrian, but it can contribute a safer environment by influencing a driver to travel slower and by providing pedestrians with options to be safer.
Presence Actuated Flashers
Sucess

• “Pedestrian safety was always the foundation on which the project was based…..In the end, not only were expectations met, they were greatly exceeded….. More so, pedestrian safety has never been better.”

Dean Van Galen, Chancellor
Sight Distance at RAB’s

Question:
“How am I suppose to drive safely when I can’t see oncoming traffic”

Answer:
“We don’t want you to see through the center islands of roundabouts.”
Sight Distance

- Intersection Sight Distance
- Stopping Sight Distance
Intersection Sight Distance

- Ensures a driver can see and safely react to potentially conflicting vehicles.
- Should be evaluated 50 feet back from the circulatory roadway.
- Stopping distance for a vehicle at 15 mph is 22 feet so this allows ample reaction time for a driver anticipating the approaching roundabout.
Intersection sight distance

• The vision "triangle" is based on two conflicting approaches:
  1. Entering stream, comprised of vehicles from the immediate upstream entry.
  2. Circulating stream, comprised of vehicles that entered the roundabout prior to the immediate upstream entry.

• For vehicles traveling 15 mph, the U.S. DOT computes this distance as 143 feet.
Stopping Sight Distance

• Should be provided at every point within a roundabout and on each entering and exiting approach.

• Is the distance traveled while the vehicle driver:
  – perceives a situation requiring a stop
  – realizes that stopping is necessary
  – applies the brake, and comes to a stop.

• Stopping sight distance for a vehicle traveling 15 mph is 77 feet.
What Does It Hurt

Excessive intersection sight distance can lead to:

• higher vehicle speeds
• reduced safety for all road users (vehicles, bicycles, pedestrians)
• higher frequency of crashes.
DESIGN CONSIDERATIONS
From the Police Department

“Citizen came in to complain about the roundabout, people driving through there and passing people while in the roundabout. She was wondering if:

1. the police could monitor it for a while and

2. if there could be more signs educating people on how to drive through a roundabout.”
“Sign, sign. Everywhere a sign. Blockin' out the scenery. Breakin' my mind. Do this. Don't do that. Can't you read the sign?”
Can't You Read The Sign?
Minimal Signage
Lighting Considerations

• Most guidance points to perimeter lighting
• It front lights objects in the central island and pedestrians rather than back lighting.
• Significantly more lights and potential knockdowns are associated with perimeter lighting.
Apron Curb Choices

• 2004 - 6-inch G/J curb was used on the first 4 roundabouts on the STH system.
• 2005 - 4-inch G/J
• 2007 - Type R/T
MAINTENANCE
Low Maintenance
No Maintenance
Thank You!

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