Modern Roundabouts: More Than Just an Intersection

INDIANA
March 2012

Dave Engstrom – FHWA Resource Center Safety and Design TST
- Are roundabouts the “safest” intersection?
- Should a roundabout be the first choice for traffic control?
- Should a roundabout always be considered as an option?
- Roundabouts should only be considered for special circumstances
Features of a Modern Roundabout

- Counter-clockwise Circulatory Roadway
- Raised Central Island
- Raised Splitter Island
- Deflected Entry Path with Yield control
- Pedestrian Crossing
They are Safer: There is No Denying It!!

- They Reduce Fatal and Injury Crashes Significantly
- Crash Types are Changed
- Safety Improved in all Types of Environments (Urban, Suburban, Rural)
- Slower speeds & shorter crossings are safer for pedestrians
- It’s a FHWA Proven Safety Countermeasure
NCHRP Report 572 –  

_Roundabouts in the United States (2007)_

Before-after studies at 55 US intersections

- 35% overall decrease in crashes
- 76% decrease in injury crashes
- 81% decrease in fatal/incapacitating crashes for single lane urban roundabouts
- 71% decrease in fatal/incapacitating crashes for single lane rural roundabouts

_Summary: Roundabouts are SAFER !!!_
The NEW Proven Safety Countermeasures Web site is now available! This Web site will be your one-stop shop for information on the latest FHWA-recommended set of research-proven safety countermeasures and FHWA guidance on countermeasure considerations. The updated list of proven countermeasures was developed based on recent safety research to address intersection, roadway departure, and pedestrian issues wherever they may occur.

Many of these countermeasures are low-cost solutions, and FHWA encourages its partners to consider implementing these countermeasures broadly, as appropriate, to reap the benefits of using solutions that are known to save lives.

**UPDATED! FHWA-Recommended and Proven Countermeasures:**

- Roundabouts
- “Road Diet” (Roadway Reconfiguration)
- Pedestrian Hybrid Beacon
- Medians and Pedestrian Crossing Islands in Urban and Suburban Areas
- Corridor Access Management
- Backplates with Retroreflective Borders
- Longitudinal Rumble Strips and Stripes On Two-Lane Roads
- Safety Edge™
- Enhanced Delineation and Friction for Horizontal Curves

**LEARN MORE TODAY!**

http://safety.fhwa.dot.gov/provencountermeasures
Roundabouts are the preferred safety alternative for a wide range of intersections. Although they may not be appropriate in all circumstances, they should be considered as an alternative for all proposed new intersections on Federally-funded highway projects, particularly those with major road volumes less than 90 percent of the total entering volume. Roundabouts should also be considered for all existing intersections that have been identified as needing major safety or operational improvements. This would include freeway interchange ramp terminals and rural intersections.
Vehicle-Vehicle Conflict at Intersections

32 Conflicts

8 Conflicts
• Intersections are vulnerable roadway elements
• 21% of roadway fatalities are at intersections
## CMF’s for Conversion of 2-Way Stop Intersection to a Roundabout

<table>
<thead>
<tr>
<th>Setting (Intersection Type)</th>
<th>Traffic Volume</th>
<th>Crash Type (Severity)</th>
<th>CMF</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>All settings (One or two lanes)</td>
<td>All types (All severities)</td>
<td>0.56</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All types (Injury)</td>
<td>0.18</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td>Rural (One lane)</td>
<td>All types (All severities)</td>
<td>0.29</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All types (Injury)</td>
<td>0.13</td>
<td>0.04</td>
<td></td>
</tr>
</tbody>
</table>
### CMF’s for Converting a Signalized Intersection to a Modern Roundabout

**Table 14-3. Potential Crash Effects of Converting a Signalized Intersection into a Modern Roundabout (29)**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Setting (Intersection Type)</th>
<th>Traffic Volume</th>
<th>Crash Type (Severity)</th>
<th>CMF</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>(One or two lanes)</td>
<td></td>
<td>All types (All severities)</td>
<td>0.99*</td>
<td>0.1</td>
</tr>
<tr>
<td>Convert signalized intersection to modern roundabout</td>
<td>Suburban (Two lanes)</td>
<td>Unspecified</td>
<td>All types (Injury)</td>
<td>0.40</td>
<td>0.1</td>
</tr>
<tr>
<td>All settings (One or two lanes)</td>
<td></td>
<td></td>
<td>All types (All severities)</td>
<td>0.33</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>All types (All severities)</td>
<td>0.52</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>All types (Injury)</td>
<td>0.22</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Base Condition: Signalized intersection.

**NOTE:** Bold text is used for the most reliable CMFs. These CMFs have a standard error of 0.1 or less.
*Observed variability suggests that this treatment could result in an increase, decrease, or no change in crashes. See Part D—Introduction and Applications Guidance.

The study from which this information was obtained does not contain information related to the posted or observed speeds at or on approach to the intersections that were converted to a modern roundabout.
Why are they SAFER for Vulnerable Users?

• Slower speeds for all motorists
• Shorter crossing distances
• Only crossing one direction of travel at a time
• Refuge island
Vehicle-Pedestrian Conflicts at Intersections

16 Conflicts

8 Conflicts

Likelihood of a pedestrian fatality when hit at vehicle speed
They are Efficient: Bring on the Traffic!!

- Volume Range – 0 to 50,000+ AADT
- Self Regulating 24 Hours a Day
- Facilitate U-tURNS on Corridors
- No Warrants Needed
- Complete Streets
They are Diverse: Small, Big, Round, Ellipse, 3 legs, 6 legs, etc...

- Difficult Geometry (skews, closely spaced intersections, 5/6 legs)
- Doesn’t Necessarily Need to be Round
- Turn Lanes Not Required
- Wide Nodes and Narrow Roads

Photo Source: Google Earth
Can You Identify the Fatal Flaws of a Design?

• Be Able to Identify Fatal Flaws
  – NO or Little Deflection
  – Vehicle Path Overlap
  – Inconsistent Speeds (Between circulating and approach drivers)
  – If you were a truck driver would you want to traverse a 6 inch Vertical Curb?
Can you See the Subtle Design Differences?

Photo Source: Bruce Robinson

Photo Source: Lee Rodegerdts
Vehicle Path Overlap
Flexibility & Diversity

• Accessibility – A Civil Rights Issue
• Mini Roundabouts – Not a Neighborhood Traffic Calming Circle
• Rural – High Speed Approaches
• High Capacity – 3 and 4 lane Entries and Access Management
Accessibility: It’s a Civil Rights Issue
Accessibility: It’s a Civil Rights Issue
Mini Roundabouts

- Diameter - 50 to 90 ft
- Traversable Center Island
- Up to ~ 15,000 AADT
- Urban/Suburban
- 20 – 35mph Roadways
- Low Truck Volume
- Higher capacity than stop control
- Fit into existing intersection ROW
- Improve intersection operating efficiency and safety
- Low cost ($25,000 to $50,000 per intersection)
Design Template – 36’ x 36’
Before

Takoma Park, MD
Kirklynn Ave and Kingwood DR

After
To Be Constructed, Lake Stevens, WA
Minimizing Impacts, Optimizing Access
600,000 sq ft mixed-use retail development, "Green Oak Village Place"
Resources: What is at your fingertips?

Welcome to the FHWA Office of Safety’s

**Roundabout Outreach and Education Toolbox**

This Toolbox is designed to be a highly useable, online reference that connects transportation professionals with outreach resources from across the country to help them obtain public support for roundabouts. It includes:

- Case studies of outreach success stories
- Outreach implementation guidance
- Products including presentations, videos and brochures

Simply use the form to the right to search or browse the Toolbox to find the resources you need.

**Search the Toolbox**

**Browse by Attribute**

Select one or more browse options below to narrow your results.

- Outreach Strategy
- Outreach Product Type
- Roundabout Complexity
- Roundabout Setting
- Implementation Stage
- Geographic Region
- Target Audience
- State

[View All] [Search]
Roundabouts P2P Program

• Accelerate the rate of roundabouts implementation across the U.S.
• Facilitate timely access to key, peer-based expertise
• Create and foster relationships within the roundabouts community
Example P2P Expertise Areas

- Pedestrians and Accessibility
- Geometric Design
- Lighting and Landscaping
- Work Zones (construction/maintenance)
- Marketing and Outreach
- Working with Elected Officials
- Operational Analysis
- Bicycles and Transit
- Traffic Control Devices
- Selecting/Sizing a Roundabout
- Gaining Public Support
Possible Forms of P2P Assistance

- Phone/Conference Calls
- E-mail Exchanges/Support
- Virtual Dialogues (video/web conferencing)
- Specific Presentations
- Workshops and Training
- Design Review Assistance
- Peer Exchanges
- Site Visits (scans or reverse-scans)
Program Access & Contacts

• Program Email and Phone
  RoundaboutsP2P@dot.gov or (866) P2P-FHWA [727-3492]

• Program Website
  http://safety.fhwa.dot.gov/intersection/roundabouts/P2P
Current Research and Publications

- NCHRP 674 - Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities
- NCHRP 03-100 (Current) Evaluating the Performance of Corridors with Roundabouts
- FHWA - Accelerating Roundabout Implementation in the United States: Evaluations to Address Key Issues
- FHWA - Mini Roundabout Safety and Operational Study
FHWA-NHI 380096 - Roundabouts: Intersections Designed for Safety

• 1 day Overview Course (not a design course)
• Good Primer Course
The Resource Center and Headquarters are here to help you with roundabout inquiries...

- Hillary Isebrands – FHWA RC–Safety and Design TST, hillary.isebrands.dot.gov
  Lakewood, CO
  (720)-963-3222
  (720)-545-4367

- Jeff Shaw – HQ, Office of Safety jeffrey.shaw@dot.gov
  Matteson, IL
  (708)-283-3524