Really Quick Roundabout History

- 1966 – Give-way rule changed in UK
- Roundabout explosion (not in US)
- 1990’s – Roundabouts introduced in US
- 2018 – Roughly 5000 roundabouts in US!
Myth 1: They built a bunch of roundabouts in NJ in the 60’s and now they’re ripping them out!
Reasons for roundabouts growing

- Safer
- More efficient (less delay)
- More aesthetic design opportunities
- Reduced vehicle emissions – greener!
- Access management (provides U-turn location)
- Less ROW required for approach lanes
- To deal with odd intersections
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Available resources are growing

- TRB Standing Committee on Roundabouts (ANB75)
  - Primary roundabout research committee in U.S.
  - Annual Meeting – January in D.C.
  - Mid-year web meeting, webinars, workshops
  - Led development of NCHRP 672
  - Information Resource Center
    http://www.trb.org/ANB75/ANB75.aspx

- Listserv
  - http://trbroundabouts.com/listserv/
US Design and Planning Resources

2000

Roundabouts: An Informational Guide

2010

NCHRP Report 672
Roundabouts: An Informational Guide
Second Edition

BURGESS & NIPLE
Other resources/guidance

- States and local governments
- Wisconsin DOT – good design resource

_Facilities Development Manual_  
Wisconsin Department of Transportation  
Chapter 11  
Section 26  
Roundabouts

1.1 General
This section and its sub-sections are comprised of roundabout design and operations guidelines developed through research and experience. Much of the prescribed guidance has been proven through application, evaluation and refinement - a truly continuous improvement process.

The Department has updated previous versions of this guide to account for changes in national roundabout...
NCHRP research reports available

- NCHRP 674 - *Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities* (2011)
- NCHRP 834: *Guidelines for the Application of Crossing Solutions at Roundabouts and Channelized Turn Lanes to Assist Pedestrians with Vision Disabilities* (2017)
Ongoing/future NCHRP research

- FHWA - Mini Roundabout Safety and Operational Study (Anticipated 2018)
- NCHRP 17-70: Development of Roundabout Crash Prediction Models and Methods (Anticipated 2018)
- NCHRP 03-130 Update to the Roundabout Informational Guide (start date mid 2018)
Myth 2: Roundabouts are not safe!

Q7 As a motorist, how safe do you feel in a roundabout compared to an intersection with traffic signals?

Answered: 2,790  Skipped: 217

- More safe
- About the same
- Less safe
- NA - I do not use roundabouts...
Safety benefits are better defined now

<table>
<thead>
<tr>
<th>Area Type/Severity</th>
<th>CMF</th>
</tr>
</thead>
<tbody>
<tr>
<td>All/Injury</td>
<td>0.68</td>
</tr>
<tr>
<td>Urban/Injury</td>
<td>0.4</td>
</tr>
<tr>
<td>Suburban/All</td>
<td>0.33</td>
</tr>
<tr>
<td>All/All</td>
<td>0.52</td>
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<tr>
<td>All/Injury</td>
<td>0.22</td>
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<tr>
<td>Suburban/All</td>
<td>0.79</td>
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<tr>
<td>Urban-Suburban/All</td>
<td>0.34</td>
</tr>
<tr>
<td>Suburban/All</td>
<td>0.58</td>
</tr>
<tr>
<td>Suburban/Injury</td>
<td>0.26</td>
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</tbody>
</table>

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**Available Crash Modification Factors**

**Two-Way Stop-Controlled Intersection to a Roundabout**

- 82% Reduction in severe crashes

**Signalized Intersection to a Roundabout**

- 78% Reduction in severe crashes

*Source: Highway Safety Manual*
Myth 3: # of crashes will always decrease when converting to a roundabout

• Property damage crashes could increase!
• Especially at multilane roundabouts
• Most especially at “2x2” roundabouts
MORPC top-100 high-crash intersections

<table>
<thead>
<tr>
<th>Location</th>
<th>Rank</th>
<th>3-year Crash Frequency</th>
<th>Severity Rank (EPDO/MEV)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cemetery Rd &amp; Main St</td>
<td>34</td>
<td>262</td>
<td>152th (1.40)</td>
<td>2x2 on all 4 approaches</td>
</tr>
<tr>
<td>Main St &amp; Scioto Darby Rd</td>
<td>40</td>
<td>140</td>
<td>140th (1.81)</td>
<td>Skew issue</td>
</tr>
<tr>
<td>E. Bridge &amp; Riverside Dr</td>
<td>46</td>
<td>173</td>
<td>147th (1.62)</td>
<td>3x2 NB Approach</td>
</tr>
<tr>
<td>Riverside Dr &amp; Home Rd</td>
<td>51</td>
<td>112</td>
<td>149&lt;sup&gt;th&lt;/sup&gt; (1.51)</td>
<td>2x2</td>
</tr>
</tbody>
</table>

EPDO range for other intersections 1.62 – 4.72
“Safe” or not?

- Absolutely “safer” than other intersection types in terms of risk of serious injury!

<table>
<thead>
<tr>
<th>Total Crashes</th>
<th>Fatality</th>
<th>Total Injury</th>
<th>Injury Severity</th>
<th>EMS Transp</th>
</tr>
</thead>
<tbody>
<tr>
<td>231</td>
<td>0</td>
<td>18</td>
<td>0 Serious Injury</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7 Minor Visible Injury</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11 No Visible Injury</td>
<td></td>
</tr>
</tbody>
</table>

Since Roundabout Opened in 2011

Property Damage Crash: 411 (92%)

Injury Crash: 39 (9%)
Capacity analysis methods evolving

• **Highway Capacity Manual**
  - HCM 2010 model based on NCHRP 3-92
  - HCM 6th Edition model based on NCHRP-572
  - Empirical (linear regression), lane based
  - Effect of geometry determined to be negligible

• **Sidra**
  - Australian data
  - Lane-based gap acceptance theory model
  - Effect of geometry included

• **RODEL**
  - UK TRL Empirical Model
  - Significantly influenced by geometry
  - Approach based

• **Simulation** (VISSIM, TransModeler, others)
# Software Results Comparison

## PM Peak Average Delay/Vehicle

<table>
<thead>
<tr>
<th></th>
<th>NB</th>
<th>WB</th>
<th>SB</th>
<th>EB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HCM 2010</strong></td>
<td>40.2</td>
<td>42.5</td>
<td>30.2</td>
<td>15.4</td>
</tr>
<tr>
<td><strong>HCM 6th Edition</strong></td>
<td>15.2</td>
<td>51.4</td>
<td>19.1</td>
<td>16.2</td>
</tr>
<tr>
<td><strong>Sidra w/1.1 Env. Factor</strong></td>
<td>7.1</td>
<td>18.6</td>
<td>9.4</td>
<td>13.9</td>
</tr>
<tr>
<td><strong>VISSIM (Isolated)</strong></td>
<td>2.1</td>
<td>43.6</td>
<td>6.2</td>
<td>93.3</td>
</tr>
<tr>
<td><em><em>RODEL1 for Windows</em> w/ estimated effective width</em>*</td>
<td>9.3</td>
<td>6.4</td>
<td>5.5</td>
<td>6.7</td>
</tr>
</tbody>
</table>

*BURGESS & NIPE*
More agencies are starting smaller, expanding later
Life-cycle benefits being considered

<table>
<thead>
<tr>
<th>Life Cycle Benefit/Cost Ratio</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety Benefit of a Roundabout</td>
<td>$2,903,623</td>
</tr>
<tr>
<td>Delay Reduction Benefit of a Roundabout</td>
<td>$2,600,555</td>
</tr>
<tr>
<td><strong>Total Benefits</strong></td>
<td><strong>$5,504,178</strong></td>
</tr>
<tr>
<td>Added Operations &amp; Maintenance Costs of a Roundabout</td>
<td>$(41,161)</td>
</tr>
<tr>
<td>Added Capital Costs of a Roundabout</td>
<td>$350,000</td>
</tr>
<tr>
<td><strong>Total Costs</strong></td>
<td><strong>$308,839</strong></td>
</tr>
<tr>
<td><strong>Life Cycle Benefit/Cost Ratio</strong></td>
<td><strong>17.8</strong></td>
</tr>
</tbody>
</table>

Example using FDOT Roundabout B/C Procedures
ADA options expanding

- Current Proposed PROWAG Rules Language
  
  **R306.3.2 Pedestrian Activated Signals.** At roundabouts with multi-lane pedestrian street crossings, a pedestrian activated signal complying with R209 shall be provided for each multi-lane segment of each pedestrian street crossing, including the splitter island. Signals shall clearly identify which pedestrian street crossing segment the signal serves.

- “Equivalent Facilitation”
  - NCHRP 674
  - Rectangular Rapid Flashing Beacon (RRFB)
  - Raised crosswalks
Myth 4: Most people hate roundabouts

It’s called kick backs people, doesn’t have to be effective, just as long as everyone gets a piece of the tax payer pie!

Yes they are stupid. Whose idea was it to start with? Some kid that was playing a computer game for the last 10 years? LOL get a real engineer!

They are the circle of death! I hate those things!
Q3. As a driver, how would you rate your general opinion of roundabouts?

- Strongly Favor: [Bar Graph]
- Favor: [Bar Graph]
- Neutral: [Bar Graph]
- Oppose: [Bar Graph]
- Strongly Oppose: [Bar Graph]

Answered: 2,789, Skipped: 218
When you’re wrong, you’re wrong. And when it comes to the Richland Avenue roundabout, I’m woman enough to admit I was wrong.

It seems as though the engineers behind the roundabout knew exactly what they were doing when they brought the roundabout concept to Athens.

I will gladly attend the dedication ceremony... and personally thank the individuals behind the project.
Truth: Single lane roundabouts are easy!

Q17 Single-lane roundabouts are easy to use and understand.

Answered: 2,681   Skipped: 326
Truth: Most people are OK with multilane roundabouts
Myth 5: Roundabouts are not safe for pedestrians

Q10 As a pedestrian, how safe do you feel in a roundabout compared to an intersection with traffic signals?

Answered: 2,755  Skipped: 252

- More safe
- About the same
- Less safe
- NA - I do not use roundabouts
Do signalized intersections really feel safer?

- Key vehicle/pedestrian conflicts:
  1. Right turns on green (legal)
  2. Crossing movements on red (high-speed, illegal)
  3. Left on green (legal for permitted phasing)
  4. Right on red (typically legal)
Roundabouts are easy for pedestrians to cross (but there are some challenges)

- 2 conflicts exist for each crossing
  - Conflict with entering vehicles
  - Conflict with exiting vehicles
Biggest pedestrian concerns

- Lack of yielding, especially on exits
- Accelerating speeds on exits
- Vehicle in “2\textsuperscript{nd} Lane”
Case in point
Public involvement approaches improving

• Use good visuals — put the project in context
• Bust myths and misconceptions with facts and studies
• Emphasize the safety benefits
• Use models to illustrate the efficiency
• Be genuine and honest
• Know your stuff!
• Use multimedia
www.burgessniple.com/event/2018/otec
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