Modern Roundabouts

Presented By:
Nate Stong, PE Rick Engineering Company
Sean Houck, PE Kimley-Horn

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Introduction to Roundabouts

• What is a roundabout
• Why they work
• Types of roundabouts
• Benefits
• Examples
What is a Roundabout?

- Traffic Control
  - Yield at Entry

- Traffic Deflection
  - Pavement markings and raised islands direct traffic into a one-way counterclockwise flow

- Geometrics
  - The radius of the circular road and the angles of entry are designed to slow the speed of vehicles
A Modern Roundabout IS NOT...
For Example...

- 600+ feet
- 120-250 ft
Why They Work

1. Cars entering a roundabout must yield to those already in the circle.

2. Curved geometry results in low speeds.

3. With all cars traveling in the same direction, roundabouts eliminate head-on collisions, as well as left turn conflicts, one of the most dangerous moves in an intersection.

4. With no traffic lights to divert drivers’ attention upward, roundabouts keep motorists focused on the cars and pedestrians around them.
## Types of Roundabouts

<table>
<thead>
<tr>
<th>Design Element</th>
<th>Mini-Roundabout</th>
<th>Single-Lane Roundabout</th>
<th>Multilane Roundabout</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desirable maximum entry design speed</td>
<td>15 to 20 mph (25 to 30 km/h)</td>
<td>20 to 25 mph (30 to 40 km/h)</td>
<td>25 to 30 mph (40 to 50 km/h)</td>
</tr>
<tr>
<td>Maximum number of entering lanes per approach</td>
<td>1</td>
<td>1</td>
<td>2+</td>
</tr>
<tr>
<td>Typical inscribed circle diameter</td>
<td>45 to 90 ft (13 to 27 m)</td>
<td>90 to 180 ft (27 to 55 m)</td>
<td>150 to 300 ft (46 to 91 m)</td>
</tr>
</tbody>
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Source: US Department of Transportation: Federal Highway Administration
# Types of Roundabouts

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<td>Central island treatment</td>
<td>Fully traversable</td>
<td>Raised (may have traversable apron)</td>
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</tr>
<tr>
<td>Typical daily service volumes on 4-leg roundabout below which may be expected to operate without requiring a detailed capacity analysis (veh/day)*</td>
<td>Up to approximately 15,000</td>
<td>Up to approximately 25,000</td>
<td>Up to approximately 45,000 for two-lane roundabout</td>
</tr>
</tbody>
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*Operational analysis needed to verify upper limit for specific applications.

Source: US Department of Transportation: Federal Highway Administration
Safety Benefits – Reduced Conflict Points
Safety Benefits - Crash Severity

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<th>Typical 4-leg intersection</th>
<th>Roundabout</th>
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<tr>
<td>Angle</td>
<td>Sideswipe</td>
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<td>Left turn</td>
<td></td>
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- Typical 4-leg intersection
  - Angle
  - Left turn
- Roundabout
  - Sideswipe
Safety Benefits - Crash Reduction

- Convert two-way stop to roundabout:
  - All crashes: 44%
  - Fatal/injury crashes: 78%

- Convert signalized to roundabout:
  - All crashes: 48%
  - Fatal/injury crashes: 60%

Source: 2010 US Department of Transportation: Federal Highway Administration
Reduced Delay

Roundabouts move traffic through an intersection more quickly, with less congestion on approaching roads.

- 89% reduction in delays
- 56% reduction in vehicle stops

Source: Washington State DOT

Source: Mark Doctor, P.E., FHWA Resource Center
Pedestrian and Bicycle Circulation

Tips for safely walking and biking through a roundabout

Walk around the outside; don’t cross through the middle

Ride your bike as a vehicle or walk your bike as a pedestrian

Research is ongoing on additional treatments and design considerations to address the needs of visually impaired pedestrians.

Photo Credit: Carmana & City of Edmunds, WA
Pedestrian and Bicycle Circulation

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Photo Credit: Dan Burden
Figure 5.9. Driver focus at different speeds (Source: TGM 1999)
Large Vehicle Accommodation

- **Semi-Trucks**
  - Tractor stays on pavement
  - Trailer can off-track onto mountable apron

- **Fire Trucks and Buses**
  - Not required to traverse mountable apron
Central Island Landscaping / Art
Corridors – Bird Rock Road, La Jolla, CA

- 20,000 vehicles per day
- 15% increase in business
- Slower vehicle speeds = Increased business exposure
- Access Management/fewer left turns = Increased driver comfort and safety
- Families feel comfortable walking around = Increased ped traffic
- Noise levels reduced, better conversations, less stress
School Zones

• Slower vehicular speeds
• Shorter crossing distances
• Reduced number of conflict points
• Cross one direction of traffic at a time, with refuge in splitter island
Benefit/Cost Analysis

Benefits of intersection control are expressed in terms of safety, delay, and emissions.

Source: FHWA
Benefit/Cost Analysis

**Delay**
- The cost of delay for **SIGNAL** is 2.5x more than **ROUNDABOUT**

**Safety Cost**
- The cost of crashes for **SIGNAL** is 9x more than **ROUNDABOUT**

**Initial Capital Cost**
- The initial capital cost for **ROUNDABOUT** is 2.4x more than **SIGNAL**

**Accumulated Costs Between Proposed Alternatives**
- The graph shows the accumulated costs between the proposed alternatives from 2017 to 2047.
Roundabouts are Good for Older Drivers

- Lower speeds through roundabout
- Forgiving, mistakes not lethal
- Longer decision making time
- NO demand to accurately judge closing speeds of fast traffic
- Low energy crashes
- No wide visual scans
- Simple decision-making
- By 2020, the 85 percentile design driver will be someone aged 65 or older

Source: Mark Doctor, P.E., FHWA Resource Center
“By 2025, a quarter of all drivers in the United States will be over the age of 65. Intersections are the single most dangerous traffic environment for drivers of any age with left-hand turns being the single most dangerous traffic maneuver that any of us can make. Forty percent of all crashes that involve drivers over the age of 65 occur at intersections. This is nearly twice the rate of experienced younger drivers.

“AARP would like to see more roundabouts constructed because of the many safety benefits that they present for drivers of all ages.”

“Older Americans, in particular, are supportive of roundabouts.”
- Federal Highway Administration
AAA Endorsement

AAA Safety Benefits of Highway Infrastructure, May 2017

• Safer Roads Investment Plan identified six categories of countermeasures that collectively will provide nearly 95% of the anticipated crash reductions.

• 30% of the overall fatality and serious injury reductions could come from intersection improvements.

• The intersection improvement with the greatest potential for fatality and serious injury reduction is:

CONVERSION OF EXISTING INTERSECTIONS TO ROUNDABOUTS
Roundabout Resistance

Public Attitude Towards Roundabouts
(Before and After Construction)

Source: US Department of Transportation: Federal Highway Administration
Summary

• Safe
  • Low speed (bicycle speeds)
  • Eliminate right-angle and head-on conflicts
  • Reduce vehicle/ped conflict points and exposure time

• Efficient
  • High capacity, low delay
  • Wide nodes, narrow roads

• Complete Streets
  • Multimodal

• Green Streets
  • lower emissions and noise and opportunity for stormwater quality treatment features

• Large Vehicles
  • Semi-trucks
  • Fire trucks
  • Transit buses

• Aesthetics
  • Gateway - community identity
  • Landscaping & Public Art