West Lafayette Roundabout Community Forum

Panelists

- Jeromy Grenard, PE – American Structurepoint
- Mike McBride, PE – City Engineer, City of Carmel, Indiana
- Craig Parks, PE – American Structurepoint

Roundabout Basics and Background

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900s – 1940s</td>
<td>Rotaries and traffic circles used</td>
</tr>
<tr>
<td>1950s</td>
<td>Circular intersections fall out of favor</td>
</tr>
<tr>
<td>1963</td>
<td>UK – reversal of traffic priority at roundabouts to “yield on entry”</td>
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<tr>
<td>1980s</td>
<td>“Modern roundabout” used throughout Europe and Australia</td>
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<tr>
<td>1990s</td>
<td>“Modern roundabout” utilized in the United States</td>
</tr>
<tr>
<td>1997</td>
<td>First roundabouts constructed in Indiana</td>
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Roundabout Numbers (May 2009)

- Have at least one roundabout
- Resource States

Melbourne, Australia: 4,400 Roundabouts
France: 27,000 in 2008 (12,000 in 1994)
Roundabouts in Indiana Communities

- Allen County / Fort Wayne
- Avon
- Bloomington
- Carmel
- Evansville
- Fishers
- Fort Wayne
- Greenfield
- Huntington County
- Indianapolis
- Kokomo
- Lafayette (planned)
- Noblesville
- Plainfield
- St. Joseph County / South Bend
- Valparaiso
- West Lafayette

Roundabout Basics and Background

Elements of a Modern Roundabout

- Yield at entry
  - Yield signs
  - Yield line
  - Circulating traffic has right-of-way
- Deflection of entering vehicle path
  - Accomplished using “splitter islands” and central island
- Entry flare
  - Lane width is increased near yield line
  - Not mandatory

Roundabouts vs. Traffic Circles

- No deflection on entries
- Use of stop signs instead of yield
- Parking in circulatory roadway
- Pedestrians encouraged in the central island to visit monument and museum

Monument Circle in Indianapolis - NOT a roundabout

Roundabouts vs. Rotaries

- High-speeds on entry and circulatory roadway
- No yield signs
- Very large diameter
- High amount of lane changing

Kingston, New York rotary being replaced with roundabout
Roundabout Terminology
- Truck Apron
- Right turn bypass Lane
- Splitter Island
- Roundabout Exit
- Center Island
- Circulatory Roadway
- Roundabout Entry or Approach

Roundabout Design Elements
- Pedestrian crossings 25' back from yield line at roundabouts
- Splitter island minimum 6' wide for refuge

Speed Reduction
- R1 = 17 mph
- R2 = 135°
- R3 = 220°

Design Tests – Vehicle Speeds
**Design Tests – Vehicle Speeds**

- Speed (mph)
- Radius (ft)

Source: “A Policy on Geometric Design of Highways and Streets”, Maximum Comfortable Speed on Horizontal Curves, AASHTO.

**Design Tests – Design Vehicle**

**Roundabout Advantages**

1. Proven safety benefits

**Roundabout Safety**

- According to the Insurance Institute of Highway Safety (IIHS), more than 800 people die and over 200,000 are injured in the U.S. each year in crashes that involve red light running.

- In 2000, the IIHS found that roundabouts had 79% fewer accidents with injuries than ordinary intersections.

- Since 2001, IIHS has issued a total of five reports promoting the use of roundabouts.
Roundabout Safety

In place in design roundabout interchange in design considered

Hazel Dell Parkway

Carmel, Indiana

Vehicular Conflict Points

- Diverging: 8
- Merging: 8
- Crossing: 16
TOTAL: 32

Carmel, Indiana Roundabouts

- Diverging: 4
- Merging: 4
- Crossing: 0
TOTAL: 8
Carmel Roundabout Locations

City-Wide Crash Data

% Accidents with Injury at All Intersections
29%

% Accidents with Injury at Roundabouts

<table>
<thead>
<tr>
<th>Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Lane</td>
<td>4%</td>
</tr>
<tr>
<td>Multi-Lane</td>
<td>7%</td>
</tr>
</tbody>
</table>

Accident Damage Cost Savings

Average Cost of Accident
- Signal: $10,500
- Roundabout: $2,500

Roundabout Advantages

1. Proven safety benefits
2. Pedestrian safety

(Statistics from Carmel Police Dept. 2006)
Pedestrian Experience

- Cars only coming from one direction
- Fewer lanes to cross
- Splitter island provides refuge
- Cars travelling at slower speeds
- Generally easy to determine gaps

Pedestrian Conflict Points

- Pedestrian Conflict Points: 16-24
- Pedestrian Conflict Points: 8

Pedestrian Myth

Myth:
Roundabouts don’t handle large numbers of pedestrians well, and are unsafe when there are too many pedestrians.

Spring Break:
- 50,000 vehicles per day, as well as 5,000+ pedestrians per day
- Only one pedestrian accident has occurred since opening roundabout in 1999

Odds of Pedestrian Fatality in Pedestrian/Vehicle Crash

<table>
<thead>
<tr>
<th>Vehicle Speed</th>
<th>Odds of Pedestrian Death, Source 1</th>
<th>Odds of Pedestrian Death, Source 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 mph</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>30 mph</td>
<td>45%</td>
<td>37%</td>
</tr>
<tr>
<td>40 mph</td>
<td>85%</td>
<td>83%</td>
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ADA Issues

- Access Board of Americans With Disabilities Act (ADA) has concerns for sight-impaired pedestrians at roundabouts
- What is the concern?
  - Safety – not primarily
  - Accessibility – yes
  - Access Board Research ongoing

ADA Issues

- Access Board preliminary recommendations
  - Single lane roundabout: ADA ramps
  - Multi-lane roundabout: ADA ramps & pedestrian signals that stop traffic

Roundabout Advantages

1. Proven safety benefits
2. Pedestrian safety
3. Roundabouts in series and as an access management tool

Golden, Colorado

Golden Road Corridor
**Golden, Colorado**

Golden Road Before/After Study

- Before = 3 years prior to rbt installation
- After = 6 years following rbt installation
- 85th percentile speeds
  - Before: 47 mph
  - After: 33 mph
- Crashes
  - All: reduced by 85%
  - With Injury: reduced by 96%
- Traffic Volumes increased by 35%
- Overall travel time through corridor: reduced by 34%

**116th Street/Illinois Street**

Carmel, Indiana

**Roundabout Advantages**

1. Proven safety benefits
2. Pedestrian safety
3. Roundabouts in series and as an access management tool
4. “Wide Nodes, Narrow Roads”

**Westfield Boulevard**

Carmel, Indiana
Westfield Boulevard
Carmel, Indiana

Roundabout Advantages

1. Proven safety benefits
2. Pedestrian safety
3. Roundabouts in series and as an access management tool
4. “Wide Nodes, Narrow Roads”
5. Difficult intersection configurations

Pontiac Street/Wayne Trace
Fort Wayne, Indiana
Roundabout Advantages

1. Proven safety benefits
2. Pedestrian safety
3. Roundabouts in series and as an access management tool
4. "Wide Nodes, Narrow Roads"
5. Difficult intersection configurations
6. Context sensitivity

Center Island Landscaping

Illinois Street and West Carmel Drive

New Development

Clay Terrace and Hamilton Town Center

Redevelopment

Speedway, Indiana
Redevelopment
Speedway, Indiana

Context Sensitivity
Keystone Avenue, Carmel, Indiana

Context Sensitivity
106th Street & Keystone Parkway

Roundabout Education
• Websites
• Flyers
• Newspaper Articles
• Presentations
• Drivers Education Programs
• Or...
Early Education

Questions / Comments

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