N. Pleasant Street / Governors Drive / Eastman Lane Intersection Enhancement

AGENDA

- Overview
- Study Process
  - Step 1 – Data Collection
  - Step 2 – Assess Existing Conditions/Problem ID
  - Step 3 – Develop and Evaluate Options
- Next Steps
  - Step 4 – Outreach, Education, Design/Approvals

May 4, 2010
Overview

- Intersection is a known bottleneck
- Intersection is a significant transition point for N. Pleasant Street – lack of a “gateway”
- Utility construction presented opportunity to address the mobility problems
- Explored the most efficient configuration for the intersection once the construction is complete:
  - No Action (status quo, return to prior state)
  - Enhanced signal
  - Roundabout
Pre-construction Condition
N. Pleasant St / Governors Dr / Eastman Ln Intersection Enhancement

Current Condition
Step 1 – Data Collection
N. Pleasant St / Governors Dr / Eastman Ln Intersection Enhancement

Traffic Demands

- 1. N. Pleasant St. NB (3,600 vpd)
- 2. N. Pleasant St. SB (5,400 vpd)
- 3. Governors Dr. EB (4,300 vpd)
- 4. Eastman Ln. WB (3,200 vpd)

Total Entering Volume (1+2+3+4 = 16,500 vpd)
## Traffic Demands

<table>
<thead>
<tr>
<th>Location</th>
<th>Weekday Daily</th>
<th>Weekday Morning Peak Hour</th>
<th>Weekday Evening Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Pleasant Street, North of Governors Drive/Eastman Lane</td>
<td>10,200</td>
<td>600</td>
<td>76% SB</td>
</tr>
<tr>
<td>North Pleasant Street, South of Governors Drive/Eastman Lane</td>
<td>7,500</td>
<td>390</td>
<td>67% SB</td>
</tr>
<tr>
<td>Governors Drive, West of North Pleasant Street</td>
<td>8,700</td>
<td>620</td>
<td>74% WB</td>
</tr>
<tr>
<td>Eastman Lane, East of North Pleasant Street</td>
<td>6,300</td>
<td>440</td>
<td>70% EB</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weekday Morning Peak Hour</th>
<th>Volume</th>
<th>%</th>
<th>Dir. Dist.</th>
<th>Weekday Evening Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Pleasant Street, North of Governors Drive/Eastman Lane</td>
<td>830</td>
<td>8.1%</td>
<td>51% SB</td>
<td>600</td>
</tr>
<tr>
<td>North Pleasant Street, South of Governors Drive/Eastman Lane</td>
<td>600</td>
<td>8.0%</td>
<td>52% SB</td>
<td>730</td>
</tr>
<tr>
<td>Governors Drive, West of North Pleasant Street</td>
<td>730</td>
<td>8.4%</td>
<td>60% EB</td>
<td>560</td>
</tr>
<tr>
<td>Eastman Lane, East of North Pleasant Street</td>
<td>560</td>
<td>8.8%</td>
<td>59% WB</td>
<td></td>
</tr>
</tbody>
</table>

*Source:* Vanasse Hangen Brustlin, Inc. Based on automatic traffic recorder (ATR) counts conducted in March 2009.

- **a:** Average daily traffic (ADT) volume expressed in vehicles per day
- **b:** Peak period traffic volumes expressed in vehicles per hour
- **c:** Percent of daily traffic that occurs during the peak period
- **d:** Directional distribution of peak period traffic
Pedestrian/Bike Volumes & Desire Lines
Step 2 – Assess Existing Condition / Problem ID
### No Action – Traffic Operations

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Approach/ Lane Group</th>
<th>Morning Peak Hour</th>
<th>Afternoon Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Delay</td>
<td>LOS</td>
</tr>
<tr>
<td><strong>2009 VOLUMES ON EXISTING GEOMETRY</strong> (before construction activity):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North Pleasant Street at</td>
<td>Governors Drive EB</td>
<td>17</td>
<td>B</td>
</tr>
<tr>
<td>Governors Drive / Eastman Lane</td>
<td>Eastman Lane WB L/T</td>
<td>17</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>Eastman Lane WB R</td>
<td>14</td>
<td>B</td>
</tr>
<tr>
<td>North Pleasant Street NB</td>
<td>B</td>
<td>16</td>
<td>B</td>
</tr>
<tr>
<td>North Pleasant Street SB</td>
<td>C</td>
<td>24</td>
<td>C</td>
</tr>
<tr>
<td>Overall Intersection</td>
<td></td>
<td>20</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2019 VOLUMES ON EXISTING GEOMETRY</strong> (before construction activity):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North Pleasant Street at</td>
<td>Governors Drive EB</td>
<td>18</td>
<td>B</td>
</tr>
<tr>
<td>Governors Drive / Eastman Lane</td>
<td>Eastman Lane WB L/T</td>
<td>19</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>Eastman Lane WB R</td>
<td>14</td>
<td>B</td>
</tr>
<tr>
<td>North Pleasant Street NB</td>
<td>R</td>
<td>12</td>
<td>R</td>
</tr>
<tr>
<td>North Pleasant Street SB</td>
<td>C</td>
<td>27</td>
<td>C</td>
</tr>
<tr>
<td>Overall Intersection</td>
<td></td>
<td>22</td>
<td>C</td>
</tr>
</tbody>
</table>

Source: VHB, Inc. using SYNCHRO 7 software.

Notes:
- NB = Northbound; SB = Southbound; EB = Eastbound; WB = Westbound; L = Left-turn; T = Through movement; R = Right-turn
- 1 Delay – Control delay per vehicle, expressed in seconds.
- 2 LOS – Level-of-Service. LOS A indicates free flow conditions with minimal delays. LOS E and F indicate congested conditions.
- 3 Q = 95th percentile queue length estimate, in feet (assume 25 feet per vehicle to convert queue length from feet to number of vehicles); shaded cells denote queues that do not clear in one signal cycle.
Step 3 – Develop and Evaluate Options
Options Evaluated

- No Action (status quo, return to prior state) - discarded
- Enhanced signal
- Roundabout

Side-by-side comparison initiated
Upgraded Signal
Roundabout
Roundabout vs. Current Condition
What is a Roundabout?

- It is not a rotary/traffic circle
- A circular intersection
- Entering traffic yields to circulating traffic
- Design features ensure slow entering and circulating vehicle speeds
What is a Roundabout?

- Generally Circular Shape
- Counterclockwise circulation
- No need to change lanes to exit
- Yield signs at entries
- Geometry that forces slow speeds
- Can have more than one lane
What is 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
Circular Intersection History

- 1900s to 1940s – Rotaries and traffic circles used
- 1950s – Circles fell out of favor
- 1963 – England develops designs for modern roundabout
- 1980s – Roundabouts used throughout Europe
- 1990s – Roundabouts gain popularity in the U.S.
  - Over 1,000 presently in U.S.
Measures of Effectiveness

1. Traffic operations – LOS, Queues, Delays
2. Truck operations – truck, bus, FD maneuvering
3. Mobility and safety
4. Environment

Right-of-way and costs are comparable
## 1. Traffic Operations - LOS

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Approach/ Lane Group</th>
<th>Morning Peak Hour</th>
<th>Afternoon Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Delay¹</td>
<td>LOS²</td>
</tr>
<tr>
<td>UPGRADED TRAFFIC SIGNAL (optimized timings, added turning lanes EB and SB approaches):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North Pleasant Street at</td>
<td>Governors Drive EB L</td>
<td>22</td>
<td>B</td>
</tr>
<tr>
<td>Governors Drive /</td>
<td>Governors Drive EB T/R</td>
<td>17</td>
<td>B</td>
</tr>
<tr>
<td>Eastman Lane</td>
<td>Eastman Lane WB L/T</td>
<td>24</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>Eastman Lane WB R</td>
<td>8</td>
<td>B</td>
</tr>
<tr>
<td>North Pleasant Street NB</td>
<td></td>
<td>12</td>
<td>B</td>
</tr>
<tr>
<td>North Pleasant Street SB L/T</td>
<td></td>
<td>15</td>
<td>B</td>
</tr>
<tr>
<td>North Pleasant Street SB R</td>
<td></td>
<td>3</td>
<td>B</td>
</tr>
<tr>
<td>Overall Intersection</td>
<td></td>
<td>16</td>
<td>B</td>
</tr>
<tr>
<td>ROUNDBOUND (1-LANE):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North Pleasant Street at</td>
<td>Governors Drive EB</td>
<td>8</td>
<td>A</td>
</tr>
<tr>
<td>Governors Drive /</td>
<td>Eastman Lane WB</td>
<td>6</td>
<td>A</td>
</tr>
<tr>
<td>Eastman Lane</td>
<td>North Pleasant Street NB</td>
<td>7</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>North Pleasant Street SB</td>
<td>7</td>
<td>A</td>
</tr>
<tr>
<td>Overall Roundabout</td>
<td></td>
<td>7</td>
<td>A</td>
</tr>
</tbody>
</table>

Source: VHB, Inc. using SYNCHRO 7 software and SIDRA 3.2 software.
Notes: NB = Northbound; SB = Southbound; EB = Eastbound; WB = Westbound; L = Left-turn; T = Through movement; R = Right-turn
1 Delay – Control delay per vehicle, expressed in seconds.
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3 Q = 95th percentile queue length estimate, in feet (assume 25 feet per vehicle to convert queue length from feet to number of vehicles)
1. Traffic Operations - Queues

<table>
<thead>
<tr>
<th>Queue Length (Feet)</th>
<th>N. Pleasant Street SB Queue, AM Peak</th>
<th>Governor's Drive EB Queue, PM Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do Nothing (Existing Signal)</td>
<td>18 veh</td>
<td>22 veh</td>
</tr>
<tr>
<td>Option 1 (Upgraded Signal)</td>
<td>7 veh 6 veh</td>
<td>7 veh 7 veh</td>
</tr>
<tr>
<td>Option 2 (Roundabout)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. Traffic Operations - Peak Hour Delay

![Graph showing traffic delay vs. volume for different types of intersections (signal and roundabout) for AM and PM periods.](image-url)
1. Traffic Operations - Roundabout Capacity

![Graph showing traffic flow analysis](image)

- AM and PM Peak Hour Counts
- Entering and circulating flow = 1800 veh/h
1. Traffic Operations - Roundabout Capacity

Exhibit 3-1. Maximum daily service volumes for a four-leg roundabout.

For three-leg roundabouts, use 75 percent of the maximum AADT volumes shown.

16,500 vpd ~ 65%
2. Truck Operations - Maneuvering

- Semi tractor-trailer (WB-50)
- PVTA Bus (with bike rack)
- Amherst Fire Truck (aerial platform truck)
3. Safety – Vehicle Conflict Points

32

- Crossing (16)
- Diverging (8)
- Converging (8)

8

- Crossing (0)
- Diverging (4)
- Converging (4)
3. Safety - Pedestrian Conflict Points

16 Crossing (16)

8 Crossing (8)
3. Safety - Pedestrian Awareness

- Splitter islands are then added with the appropriate offsets:
  - 3' 41" on the approach edge,
  - 1' 0.5" on the trailing edge.
  - 1.5' (0.5 m) here only.
3. Safety - Pedestrian Benefits

1. Drivers and pedestrians pay more attention to the environment at roundabouts than at traffic signals (no false protection)

2. Very low vehicle speeds

3. Gaps in the traffic stream are easier to gauge and determine

4. Vehicles are only coming from one direction (no red light running)

5. Fewer lanes to cross with splitter islands providing refuge areas
3. Safety - Bicycle Conflict Points

24

12

- Conflicts in common with motor vehicles
- Conflicts unique to bicycles

Bicyclist travelling as vehicle
Bicyclist travelling as vehicles

Bicycle
Motor Vehicle
Pedestrian
3. Safety – Bicycle Considerations

- Most challenging considerations of all modes
- Give the option of operating as a vehicle or as a pedestrian
- Bicycle speeds similar to vehicle speeds
3. Safety – Bicycle Considerations
3. Safety – Bicycle Considerations
3. Safety – Bicycle Considerations
3. Safety – Bicycle Considerations
3. Safety – Bicycle Considerations
3. Safety – Bicycle Considerations
3. Safety – Advance Crosswalk Markings

Figure 9C-9. Shared Lane Marking

- See Figures 38-29 and 38-35 for pavement markings on speed humps.
### 3. Safety – Crash Reduction - FHWA

<table>
<thead>
<tr>
<th>Type of roundabout</th>
<th>Sites</th>
<th>Before roundabout</th>
<th>Roundabout</th>
<th>Percent change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>Inj. (^3)</td>
<td>PDO (^4)</td>
</tr>
<tr>
<td>Single-Lane (^1)</td>
<td>8</td>
<td>4.8</td>
<td>2.0</td>
<td>2.4</td>
</tr>
<tr>
<td>Multilane (^2)</td>
<td>3</td>
<td>21.5</td>
<td>5.8</td>
<td>16.7</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>9.3</td>
<td>3.0</td>
<td>6.0</td>
</tr>
</tbody>
</table>

**Notes:**
1. Mostly single-lane roundabouts with an inscribed circle diameter of 30 to 35 m (100 to 115 ft).
2. Multilane roundabouts with an inscribed circle diameter greater than 50 m (165 ft).
3. Inj. = Injury crashes.
4. PDO = Property Damage Only crashes.

Source: (3)

**51% reduction (all crashes)**
**73% reduction (injury crashes)**
3. Safety – Crash Reduction – Insurance Institute for Hwy Safety

<table>
<thead>
<tr>
<th>Group Characteristic Before Conversion/Jurisdiction</th>
<th>Count of Crashes During Period After Conversion Without Conversion</th>
<th>Crashes Expected During After Period</th>
<th>Index of Effectiveness</th>
<th>Percent Reduction in Crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All Injury</td>
<td>Injury</td>
<td>All Injury</td>
<td>Injury</td>
</tr>
<tr>
<td>Single Lane, Urban, Stop Controlled</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bradfordton Beach, FL</td>
<td>4</td>
<td>1</td>
<td>0.9 (1.6)</td>
<td>0</td>
</tr>
<tr>
<td>Ponte Vedra Beach, FL</td>
<td>1</td>
<td>0</td>
<td>1.7 (1.7)</td>
<td>0</td>
</tr>
<tr>
<td>Goffstown, NH</td>
<td>0</td>
<td>0</td>
<td>4.2 (1.2)</td>
<td>1.2 (0.5)</td>
</tr>
<tr>
<td>Hilton Head, SC</td>
<td>5</td>
<td>0</td>
<td>4.3 (1.5)</td>
<td>1.1 (0.6)</td>
</tr>
<tr>
<td>Manchester, VT</td>
<td>1</td>
<td>0</td>
<td>1.7 (0.7)</td>
<td>0</td>
</tr>
<tr>
<td>Manhattan, KS</td>
<td>0</td>
<td>0</td>
<td>4.2 (1.1)</td>
<td>1.2 (0.5)</td>
</tr>
<tr>
<td>Montpellier, VT</td>
<td>1</td>
<td>0</td>
<td>4.3 (1.5)</td>
<td>1.1 (0.6)</td>
</tr>
<tr>
<td>Santa Barbara, CA</td>
<td>17</td>
<td>2</td>
<td>17.97 (4.9)</td>
<td>0</td>
</tr>
<tr>
<td>West Boca Raton, FL</td>
<td>7</td>
<td>0</td>
<td>8.1 (1.6)</td>
<td>2.6 (1.3)</td>
</tr>
<tr>
<td>Entire group (9)</td>
<td>44</td>
<td>4</td>
<td>112.6 (10.2)</td>
<td>16.6 (2.6)</td>
</tr>
<tr>
<td>Single Lane, Rural, Stop Controlled</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anne Arundel County, MD</td>
<td>14</td>
<td>2</td>
<td>24.6 (4.9)</td>
<td>6.2 (1.7)</td>
</tr>
<tr>
<td>Carroll County, MD</td>
<td>4</td>
<td>1</td>
<td>15.2 (2.6)</td>
<td>3.2 (0.9)</td>
</tr>
<tr>
<td>Cecil County, MD</td>
<td>10</td>
<td>1</td>
<td>14.3 (2.9)</td>
<td>6.6 (1.4)</td>
</tr>
<tr>
<td>Howard County, MD</td>
<td>14</td>
<td>1</td>
<td>36.7 (5.5)</td>
<td>7.7 (2.1)</td>
</tr>
<tr>
<td>Washington County, MD</td>
<td>2</td>
<td>0</td>
<td>14.4 (3.1)</td>
<td>4.2 (1.3)</td>
</tr>
<tr>
<td>Entire group (5)</td>
<td>44</td>
<td>5</td>
<td>105.2 (8.4)</td>
<td>26.9 (3.4)</td>
</tr>
<tr>
<td>Multilane, Urban, Stop Controlled</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avon, CO</td>
<td>17</td>
<td>1</td>
<td>12.2 (3.1)</td>
<td>0</td>
</tr>
<tr>
<td>Avon, CO</td>
<td>13</td>
<td>0</td>
<td>30.1 (5.7)</td>
<td>2.3 (1.0)</td>
</tr>
<tr>
<td>Vail, CO</td>
<td>14</td>
<td>1</td>
<td>15.1 (4.4)</td>
<td>6</td>
</tr>
<tr>
<td>Vail, CO</td>
<td>61</td>
<td>1</td>
<td>50.9 (7.0)</td>
<td>8.5 (1.9)</td>
</tr>
<tr>
<td>Vail, CO</td>
<td>8</td>
<td>0</td>
<td>9.8 (2.1)</td>
<td>3</td>
</tr>
<tr>
<td>Vail, CO</td>
<td>15</td>
<td>1</td>
<td>11.8 (2.3)</td>
<td>3</td>
</tr>
<tr>
<td>Entire group (7)</td>
<td>131</td>
<td>4</td>
<td>153.8 (12.4)</td>
<td>n/a</td>
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<tr>
<td>Urban, Signalized</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avon, CO</td>
<td>44</td>
<td>1</td>
<td>49.6 (7.0)</td>
<td>5.4 (1.7)</td>
</tr>
<tr>
<td>Avon, CO</td>
<td>18</td>
<td>0</td>
<td>52.1 (7.0)</td>
<td>6.3 (1.7)</td>
</tr>
<tr>
<td>Gainesville, FL</td>
<td>11</td>
<td>3</td>
<td>4.9 (1.5)</td>
<td>1.3 (0.6)</td>
</tr>
<tr>
<td>Entire group (3)</td>
<td>73</td>
<td>4</td>
<td>106.7 (10.0)</td>
<td>12.0 (2.5)</td>
</tr>
<tr>
<td>All conversions</td>
<td>292</td>
<td>14</td>
<td>476.2 (20.7)</td>
<td>57.8 (5.1)</td>
</tr>
</tbody>
</table>

32% reduction (all crashes)  
68% reduction (injury crashes)
3. Safety – Crash Reduction – Maryland

Before & After Mean Accident Rates for Total and Injury Severity at Roundabouts

Before Period

- Mean Total Accident Rate: 1.53

After Period

- Mean Total Accident Rate: 0.97
- Mean Injury Accident Rate: 0.48

Legend:
- Blue: Mean Total Accident Rate
- Pink: Mean Injury Accident Rate
4. Environment – Vehicle emissions/delays/noise (Idling time)

Because roundabouts reduce vehicle stop-and-start cycles, they also reduce vehicle emissions, noise pollution, and fuel consumption.
4. Environment - Annual delay reduction

~4,000 veh-hours per year

Exhibit 3-12. Delay savings for roundabout vs. signal, 50 percent volume on major street.

When volumes are evenly split between major and minor approaches, the delay savings of roundabouts versus signals are especially notable on two-lane approaches with high left turn proportions.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Approach</th>
<th>Signal Production (kg/h)</th>
<th>Roundabout Production (kg/h)</th>
<th>Difference (kg/h)</th>
<th>% Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>South</td>
<td>126.9</td>
<td>100.3</td>
<td>-26.6</td>
<td>20.96</td>
</tr>
<tr>
<td></td>
<td>East</td>
<td>219.6</td>
<td>147.8</td>
<td>-71.8</td>
<td>32.88</td>
</tr>
<tr>
<td></td>
<td>North</td>
<td>106.9</td>
<td>99.3</td>
<td>-7.6</td>
<td>7.11</td>
</tr>
<tr>
<td></td>
<td>West</td>
<td>119.4</td>
<td>102.6</td>
<td>-16.8</td>
<td>14.07</td>
</tr>
<tr>
<td></td>
<td><strong>Intersection Total</strong></td>
<td><strong>571.9</strong></td>
<td><strong>450.0</strong></td>
<td><strong>-121.9</strong></td>
<td><strong>21.31</strong></td>
</tr>
<tr>
<td>NOX</td>
<td>South</td>
<td>0.292</td>
<td>0.247</td>
<td>-0.045</td>
<td>15.41</td>
</tr>
<tr>
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GHG Reductions:
- 21% CO2
- 16% NOX
- 19% CO
- 26% HC
### Measures of Effectiveness - Summary

<table>
<thead>
<tr>
<th>Measure</th>
<th>Signal</th>
<th>Roundabout</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Traffic operations – LOS, Queues, Delays</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>2. Truck operations – truck, bus, FD</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>3. Mobility and safety</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>4. Environment (emissions, noise, fuel consumption, aesthetics)</td>
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</table>
Overview of Roundabout Benefits

- Slower speeds, traffic calming
- Crash reduction and severity, fewer conflict points
- Gateway creation, aesthetics, wayfinding
- Improved mobility (vehicles, pedestrians, bikes)
- Lower delays, reduced emissions and noise
- Ease of maintenance
Step 4 – Outreach, Education, Design/Approvals
Outreach and Education

- Initial resistance is common (confusion of roundabout with rotary)
- US Experience:
  - Before: 3 to 2 against
  - After: 4 to 1 in favor
WHAT ARE PEOPLE SAYING ABOUT
ROUNDABOUTS?

People's reactions to roundabouts seem to be skeptical before they are introduced and positive after they are installed. To illustrate this, the following is an excerpt from an upstate NY newspaper reporting about a proposed roundabout in Glens Falls:

"The experience of driving through a nearby roundabout in Greenwich has changed Andrea Lyons' outlook on a plan to alleviate traffic congestion in downtown Glens Falls. The director of the Charles R. Wood Theater and a Greenwich, NY native said she was skeptical when the Greenwich roundabout was first talked about."

"I'm not an expert on traffic, but I was convinced it wasn't going to work out," she said. Now, she describes driving through the circular intersection as an "awesome" experience.

"I guess sometimes you just have to trust the opinions of traffic experts," she said.

Here are some other quotes:

"When it was first installed, we anticipated it would be difficult... But, surprisingly, it's gone very well."
- Brattleboro, VT

"It does slow them down... We used to get a lot of people coming down at high speeds, but now you have to stop to get through those circles."
- Howard County, MD

"We have had a lot of people not very happy about the idea of roundabouts, but after they are constructed, those fears mostly go away."
- Seattle, WA

"When I first heard it was going in, I thought, 'That's crazy, that will never work.'... Now, traffic keeps moving all the time. I've changed my mind 180 degrees."
- Bellevue, WA

"At first, I was a little apprehensive — wondering how they would work to slow traffic... Overall, I'm very pleased with the way they've slowed traffic down. Traffic in general is traveling at a much slower rate in front of our school than it was prior to the roundabouts."
- Lineville Intermediate Principal Chuck Tempier
  Howard, Wisconsin

NYSDOT Survey Results

<table>
<thead>
<tr>
<th>Roundabouts</th>
<th>Public Acceptance of</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before Construction</td>
<td>Low 20%  Moderate 59%  High 12%</td>
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<tr>
<td>After Construction</td>
<td>3% Low  12% Moderate 55%</td>
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</tbody>
</table>

Source: NYSDOT SPR C-01-47
Slow Down
Speeds of 15 mph or less are adequate when driving in roundabouts.

Yield
Vehicles must yield before entering a roundabout. Look to your left before entering.

Entering the Roundabout
Once inside, DO NOT STOP. The vehicle in the roundabout has the right-of-way.

Stagger Vehicles
While in the roundabout, stagger your vehicle with those around you. Always give yourself some room.

Destination Sign
Look for designation signs and exit in that direction.

Exit the roundabouts
Remember to check your mirrors, look to the right and use your turn signals.

Missed your exit?
No problem—just go around one more time.

On a bicycle
Use the same guidelines as other vehicles.

Please remember: The Ulysses Circle is the only single-lane roundabout.
Editorial

Shocker: Maybe the roundabout isn’t so bad after all

We at the Trail have had a lot of fun in the past year taking stabs at Vail’s roundabout, projecting all manner of doomsday scenarios for the project...

...Our primary concern was the combination of slick roads, rental cars and an unfamiliar driving concept. However, people seem to have figured out the contraption. What’s more, the gridlock appears to be gone.

Video Courtesy of: Ourston Roundabout Engineering
**WHY ROUNDABOUTS?**

- Safer than signalized intersections
  - Modern roundabouts greatly reduce the potential for high-speed, right-angle, rear-end and left turn head-on collisions. In traditional four-way traffic intersections, there are 32 points of conflict in which two vehicles may collide. Modern roundabouts have only 8 conflict areas, greatly reducing potential crashes.

- Reduces frequency and severity of crashes
  - A study printed in the Transportation Research Record reported that converting 23 test intersections throughout the U.S. from traffic signals to roundabouts reduced injury crashes by 80 percent and reduced all crashes by 40 percent in those areas.

- Reduces traffic delays / increases traffic capacity
  - Traditional traffic signals usually stop two or more directions of traffic at one time. In roundabouts, all directions of traffic are often kept open and safely flowing.

- Reduces long-term operational costs
  - With limited or no electrical costs and lower maintenance costs, operational savings from roundabouts have been estimated at an average of $5,000 per year.

- More environmentally-friendly than traditional intersections due to less vehicle emissions, fuel use and noise
  - Because roundabouts reduce vehicle stops, they also reduce vehicle emissions and noise pollution, as well as fuel consumption.

- More aesthetically pleasing
  - The center circle of many U.S. roundabouts provide opportunity for unique community gateways and landscape/aesthetic improvements that can enhance and define corridors, cities, and tourism.

---

**ROUNDABOUT BASICS**

Entering a roundabout uses many of the same skills as making a right-hand turn out of a driveway. First, yield to pedestrians/bicyclists, then check for traffic approaching from the left. Wait for a suitable gap in traffic and proceed into the roundabout.

- Right Turn
- Left Turn
- Straight Ahead

---

**NEVADA DEPARTMENT OF TRANSPORTATION**

**NEVADA DOT**

**TRAFFIC**

**ROUNDABOUTS**

Nevada Department of Transportation
Public Information Office
1263 South Stewart Street
Carson City, NV 89712
www.nevadadot.com/roundabout
Additional traffic safety information:
www.driverfuev.com

www.nevadadot.com/roundabout
ROUNDABOUTS

The first modern U.S. traffic roundabout was constructed in Las Vegas, Nevada in 1996. Thousands of modern roundabouts can now be found throughout the U.S., joining the over 30,000 roundabouts in France and the United Kingdom.

WHAT ARE ROUNDABOUTS

Roundabouts are one-way circular intersections in which traffic flows around a center island without stop signs or signals.

Because roundabout traffic enters and exits through right turns only and speeds are reduced, the occurrence of severe crashes is substantially less than in many traditional four-way intersections.

The lower speeds within roundabouts also allow entering traffic to access smaller gaps between circulating vehicles, increasing traffic volume and decreasing delays, congestion, fuel consumption and air pollution.

![Roundabout Diagram](Image)

DRIVING IN A ROUNDABOUT

BEFORE A ROUNDABOUT

Slow down and yield to pedestrians/bicyclists. For multi-lane roundabouts, choose the appropriate lane.

ENTERING A ROUNDABOUT

Those in the roundabout have the right-of-way. Yield to driver's left and enter the roundabout when there is an adequate gap in circulating traffic flow. Do not enter a roundabout when an emergency vehicle is approaching in any direction.

IN A ROUNDABOUT

Following posted speed limits, proceed through the roundabout counterclockwise to the right of the center island. Within a roundabout, do not stop for vehicles waiting to enter the roundabout. Those driving within a roundabout have right-of-way. Use your turn signal to indicate when exiting.

Walking/Bicycling in Roundabouts

PEDESTRIANS

- Walk the perimeter of the roundabout. Never cross to the center island.
- Use designated crosswalks and watch and listen for vehicles. Even though pedestrians have the right-of-way, satisfy yourself that vehicles have recognized your presence and right to cross.
- Always use the splitter island between entries and exits for refuge.

BICYCLISTS

Bicyclists have two options while traveling through a roundabout.
- Ride like a car
  - Ride on the roundabout roadway like a car. Claim the entire circular travel lane (right hand lane in multi-lane facilities) by riding near the center of the lane as a car would.
  - Obey same driving rules as a vehicle.
- Walk like a pedestrian
  - Bicyclists may dismount and exit the approach lane before the splitter island and move to the sidewalk. Once on the sidewalk, walk your bicycle like a pedestrian.

TRUCKS/LARGE VEHICLES

Many roundabouts provide an area between the roadway and the central island over which the rear wheels of large trucks, trailers and other large vehicles can safely go. The area is known as a truck apron, and is often designated with a different type of roadway surface.
Not a Roundabout…. (Bourne, MA)
Not a Roundabout.... (Medford, MA)
Not a Roundabout…. (Johnson City, NY)
Not a Roundabout….(E. Longmeadow, MA)
Not a Roundabout....(Worcester, MA)
Not a Roundabout....(Worcester, MA)
N. Pleasant St / Governors Dr / Eastman Ln Intersection Enhancement

Not a Roundabout....(Belmont, MA)
Not a Roundabout…. (Worcester, MA) …yet
Roundabout....(Worcester, MA)
Roundabouts....(Concord NH)
Roundabout....(Montpelier VT)

Around 300' from a school

600 children per day

800 pedestrians per day

13,000 vehicles per day

Only 4 reportable crashes in 10 years – injury accidents down 69%

There are now over 40 roundabouts near schools
Roundabout (under construction)....

Figure 2

Kingston Roundabout, New York During Construction

Source: New York State Department of Transportation
Roundabout....(Fitchburg)
Roundabout....(Nantucket)
Roundabout…. (Waltham)
Roundabout....(Belmont)
N. Pleasant St / Governors Dr / Eastman Ln Intersection Enhancement

Roundabout....(Belmont)
Roundabout – Norfolk (Route 115)
Roundabout – Dedham (Needham St)
Roundabout....(Arlington)
Roundabout....(FL)
N. Pleasant Street / Governors Drive / Eastman Lane Intersection Enhancement

AGENDA

- Overview
- Study Process
  - Step 1 – Data Collection
  - Step 2 – Assess Existing Conditions/Problem ID
  - Step 3 – Develop and Evaluate Options
- Next Steps
  - Step 4 – Outreach, Education, Design/Approvals

May 4, 2010