Development Opportunities
Golden, Colorado Case Study

Minnesota Roundabout Conference
April 5-6, 2006
Alex J. Ariniello, P.E., P.T.O.E.
Overview

- Golden Roundabouts
- Other roundabout applications
  - Retail/business
  - Residential
- Roundabout Market Potential
Drivers fond of straight lines balk at traffic roundabouts, but experts say that despite initial confusion, there's safety in circles.

By Robert Sanchez
Denver Post Staff Writer

Golden

From a stoop from this window overlooking one of the city's circular intersections, John Bondinito has seen his share of smashed bumpers, broken headlights and raised middle fingers.

"The wrecks are like no other," the 27-year-old tire store manager says of the South Golden Road roundabout, one of four along the stretch of road about a mile south of downtown.

First, there was the case of the wayward driver who went the wrong way into one of the circle—called a roundabout—then narrowly escaped the surgery and the funding of oncoming traffic. Some drivers had side-to-side screech with other vehicles, while a few poor souls were so confused that they stopped midway through the curve, earning themselves a busted tail light.

But as drivers attempt to navigate the sometimes-problematic road, an increasing number of cities and towns statewide have this to say: Get used to it. Already common in Europe and a mainstay in some Colorado old towns, roundabouts are popping up at intersections in subdivisions across metro Denver, outside office complexes in Greeley and along busy roads from Fort Collins to Durango as the newest way to control burgeoning communities' traffic headaches.

In fact, transportation planners across Colorado have become so enamored of the traffic devices that the numbers have more than doubled in the state, from about 70 in 2000 to as many as 170 this year.

Colorado accounts for nearly one-fifth of all roundabouts nationwide, putting the state among the most roundabout-friendly places in the nation, along with Florida, Kansas, New York and Oregon.

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Rounding up

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Golden Roundabouts

City of Golden

- 17,000 people
- Colorado School of Mines
- Coors Brewery
South Golden Road

Suburban Highway

- Four Travel Lanes
- Center Turn Lane
- Parking/Shoulders
- 84 feet in Width
- Driveways allowed indiscriminately
Strip Retail Area

Many Businesses, including

- Several Fast Food Restaurants
- Small Shopping Center
Safety Concerns

- Unrestricted Access
- Center Turn Lane
- Width of roadway encouraged speeding
- Was difficult to cross
Impetus To Project Start

- Development proposal for a shopping center
- Need for a traffic signal at Utah Street
City Objectives for South Golden Road

- Reduce vehicular conflicts and increase safety
- Create a more aesthetically pleasing area
- Create a more pedestrian-friendly environment
- Reduce delays for entering traffic at Utah Street
- Reduce queue delays to reduce travel time
Initial Concept
for South Golden Road

- Narrow the roadway
- Provide medians and wide detached sidewalks
- Construct two roundabouts at Utah St. and Ulysses St.
City Reaction

- Receptive to roundabout concept
  - Traffic calming aspects
  - Obvious operational qualities of roundabout concept
  - Ease of U-Turns at the roundabouts
  - Requested addition of a third roundabout
Selling the Roundabout

- Biggest opponent was King Soopers, the major tenant of the new shopping center.
- City offered to tear the roundabout out if sales revenues didn’t meet expectations.
Selling The Roundabout

- Meeting with local merchants
- Fourth roundabout
Implementation

- King Soopers exceeded its sales projections
- Ulysses roundabout constructed on fast track schedule
- Opened in November, 1998
- The other three roundabouts were completed in 1999
# Roundabout Dimensions

<table>
<thead>
<tr>
<th>S. Golden Road Roundabouts</th>
<th>Inside Diameter</th>
<th>Outside Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ulysses Street (single-lane)</td>
<td>90</td>
<td>145</td>
</tr>
<tr>
<td>Utah Street</td>
<td>50</td>
<td>105</td>
</tr>
<tr>
<td>Lunnanhaus Drive</td>
<td>50</td>
<td>105</td>
</tr>
<tr>
<td>Johnson Road</td>
<td>100</td>
<td>155</td>
</tr>
</tbody>
</table>

![Roundabout Image](image-url)
Project Costs

The 3/4 mile long project cost 1.3 million:

- Four Roundabouts
- Roadway Reconstruction
- Medians, Detached Sidewalks, Utility Relocations
- Design and Landscaping
South Golden Road Experience

4 Roundabouts within 1 mile

<table>
<thead>
<tr>
<th></th>
<th>3 years prior</th>
<th>5 years after</th>
<th>% Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Accidents in Corridor</td>
<td>360</td>
<td>120</td>
<td>- 60%</td>
</tr>
<tr>
<td>Injuries</td>
<td>31</td>
<td>2</td>
<td>- 96%</td>
</tr>
<tr>
<td>Average Daily Traffic</td>
<td>15,000</td>
<td>21,000</td>
<td>+ 40%</td>
</tr>
<tr>
<td>Accident Rate (per million vehicle miles)</td>
<td>26</td>
<td>10</td>
<td>- 62%</td>
</tr>
</tbody>
</table>
Slower Speeds
But Faster Travel Times

Prior to roundabouts:
- 2 traffic signals
- Travel time of 78 sec.
- With 3rd signal
  Predicted travel time of 103 seconds

After the Roundabouts:
- Travel time reduced to 68 seconds
## Business Access

<table>
<thead>
<tr>
<th>Seconds of Delay</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Delay at Access Points</td>
<td>28</td>
<td>13</td>
</tr>
<tr>
<td>Maximum Delay at Access Points</td>
<td>118</td>
<td>40</td>
</tr>
</tbody>
</table>
Sales Tax Revenues

- 60% increase in sales tax revenues
- Only area to experience continued sales tax growth

![Graph showing sales tax revenues from 1998 to 2004 with a 60% increase]
Summary and Conclusions

- Roundabouts in a Strip Commercial Area
- Slower Speeds, Faster Travel
- Reduced Delay at Access Points
- 62% Reduction in Accident Rates
- 60% Increase in Sales Tax Revenues
Roundabout Applications

- Within Shopping Centers
- Adjacent to Shopping Centers
- Major Collectors
- Rural/Urban Interface
- Mini Roundabouts

Source: The Highway Code (UK) 98, converted to right-hand drive
Within Shopping Centers

- Acceptance by Business Community

Superior Marketplace
Superior, Colorado

750,000 SF Shopping Center
Shopping Centers

Northlands, Broomfield, CO
Adjacent to Shopping Centers

Factory Outlets, Loveland, CO

- In operation since 1998
Adjacent to Shopping Centers

Centerra Lifestyle Mall, Loveland

- 5 Legs
- Entry Statement
Adjacent to Shopping Centers

Harvest Junction, Longmont, CO
Douglas County, CO

Transit-Oriented Development
1,200 Acres
2,000 Dwelling Units
5 million SF Office/Retail
Major Hospital
Light Rail Station
Mixed Use Development
670 acres
5,000 employees
1,500 Dwelling Units
300 SF Retail

Promontory, Greeley, CO
Mini-Roundabouts

- Internal Distribution
- Smaller Design Vehicle
- Smaller size
Mini-Roundabouts

Front Range Community College, Westminster, CO

- Connect parking lots/ main access to 112th Ave
- Back-ups during peak hours
- Entry Statement
Mini-Roundabouts

Roxborough Marketplace

- 100 ft. Dia.
- Close Spacing
Major Collectors

Rock Creek Parkway, Superior, CO

- Residential area
- 4 through lanes
- Turn lanes at major intersections
- High Speeds
- Difficult for Pedestrians to cross
Major Collectors

Rock Creek Parkway/ 88th Street
Major Collectors

Rock Creek Parkway/ 88th Street

- Reduced Delays
- Reduced Queues
- Accidents reduced from 8 to 2
Major Collectors

Bike/ Pedestrian Treatments
Major Collectors

Mountain Shadows, Arvada
Major Collectors

Deer Valley Drive, Festival Ranch, AZ

- Linear Park
- Grid Network
Deer Valley Drive, Festival Ranch, AZ
Rural/ Urban Interface

Eagle, CO

- 2-lane roadway
- Slow speeds
- Delay need for 4 lanes
- May eliminate need to widen structures
Rural/Urban Interface
Roundabout Market Potential

- Roundabouts in France: 20,000
- Extrapolation to US: 93,000
- At $1 million each: $93 billion
Minnesota Roundabout Potential

- 337 roundabouts per 1 million people
- 5.15 million people in Minnesota

Extrapolation to Minnesota

1,735 Roundabouts
- 35 Existing
1,700 To be constructed

or 85/yr for 20 years
Motor Fuel Savings
for 1,700 new roundabouts

- 20,000 gallons per year per intersection
- 34 million gallons per year savings for 1,700 roundabouts
- ½ to 1% of total Minnesota motor fuel consumption
Roundabouts and Highway Safety

- **2003 Fatalities (FARS) - 42,600**
  - Injuries - 2,889,000

- **Intersection/intersection related crashes**
  - 8,700 fatality (23% of all)
  - 894,000 injury
  - 1,664,000 property damage
Traffic Signals and Highway Safety

- Signal Percentage of all intersection/intersection related crashes:
  - 23% - 2,700 fatality
  - 51% - 451,000 injury
  - 47% - 789,000 property damage
Recent Research
Signalization and Safety
Richard G. Sarchet

- **112 signals on Colorado State Highways**
- **Collected Accident Data**
- **3 years before and 3 years after**

<table>
<thead>
<tr>
<th></th>
<th>3 Years Before</th>
<th>3 Years After</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fatalities</strong></td>
<td>8</td>
<td>4</td>
<td>-50%</td>
</tr>
<tr>
<td><strong>Injuries</strong></td>
<td>651</td>
<td>991</td>
<td>+52%</td>
</tr>
<tr>
<td><strong>Prop. Dam</strong></td>
<td>662</td>
<td>1,199</td>
<td>+81%</td>
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Full Deployment of Roundabouts

For U.S.

- Reduce Fatalities by 25% or 2,000
- Reduce Injuries by 25% or 200,000

For Minnesota (1,700 new roundabouts)

- Reduce Fatalities by 30 per year
- Reduce Injuries by 3,000 per year
Summary

- Roundabouts Are Good For Business
- Can Be Integrated Into New Development At Little Cost
- Becoming Accepted By Planning & Development Community
- Significant Safety Benefits