Innovative Intersections: Putting the Pieces Together

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Tampa, Florida
Innovative Intersections: Putting the Pieces Together

- **Introduction**
- **Six criteria**
  - Overview
  - Factors to consider
  - Comparison Case Studies
- **Questions**
Series of Articles on Roundabouts
just google “circling your city”
Innovative Intersection Questions

- What movement typically has the most delay at the intersection?
- What movement requires most additional space at an intersection?
- What movement impacts progression of traffic the most?
- What movement causes most amount of pedestrian fatalities?
- What movement requires the most amount of brain function?
- What movement do we want to handle differently?
Left Turns

- Involved in many serious crashes
- Cause conflicts with pedestrians
- Reduce green time for through vehicles
- Queues can impede through vehicles
- Require significant right of way for storage
Why Consider Innovative Intersections

- High ROI
- Extend useful life of existing infrastructure
- Reduces ROW impacts
- Avoids widening and grade separation
- Fewer conflicts – Improved safety
- Less congestion – Better mobility
Innovative Intersection Options

- Full grade separated interchanges
  - SPUI
  - Diverging diamond interchange
- Grade separated intersection
  - Left turn flyover
  - Echelon
- Major at-grade improvements
  - Continuous flow intersection
  - Roundabouts
  - Florida T
  - Quadrant roadway
  - Indirect Left Turns
- Minor at-grade improvements
  - Turn lanes
  - Complete Street/Road Diet
  - Signal timing optimization
  - Active Corridor Management
Innovative Intersection Generalizations

- The best solutions:
  - Eliminates left turn conflicts
  - Simplest solution that meets the goals of the project
  - Closest to existing driver behavior/patterns

- Avoid if possible:
  - Out of direction travel unless it produces significant travel time savings, cost savings or safety benefit
  - Complex intersection layouts
  - Dropping lanes past intersections
  - Eliminating left turns without an excellent alternate
Innovative Intersections: Putting the Pieces Together

Support

Geometry

Need

Pedestrians & Transit

Constrained Funding

Access

Innovative Intersections: Putting the Pieces Together
Identify need that can’t be solved by traditional intersection improvements:

- Capacity
- Safety
- Speed control
- Community concerns
“Need” Case Study

- SR 400 at Windward Parkway – Alpharetta, GA
  - Triple Lefts option
  - Diverging Diamond options
SR 400 at Windward Parkway – Triple Lefts & 3 Lanes WB
SR 400 at Windward Parkway – DDI and 3 Lanes WB
SR 400 at Windward Parkway – DDI & 2 Lanes WB
## Year 2035 Intersection Level of Service & Estimated Construction Cost

<table>
<thead>
<tr>
<th>Intersection/Approach</th>
<th>Year 2035 - LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Triple Lefts</td>
</tr>
<tr>
<td></td>
<td>AM</td>
</tr>
<tr>
<td>Windward Parkway/NB Ramps (East)</td>
<td>C</td>
</tr>
<tr>
<td>Windward Parkway/SB Ramps (West)</td>
<td>C</td>
</tr>
<tr>
<td>Estimated Construction Cost</td>
<td>$3,300,000</td>
</tr>
</tbody>
</table>
Geometry

- Design layout and required ROW that accommodates projected traffic volumes while minimizing construction costs
- Best layout might not be possible or least expensive
- Constrained ROW can significantly influence choice of alternative
“Geometry” Case Studies

- Jimmy Carter at Buford Highway CFI – Norcross, GA
  - Best traffic operations layout not possible
  - Reduction in additional ROW
    - Compact Interchange = 669,000 s.f.
    - 2-Legged CFI = 144,000 s.f.
    - 78% reduction in required additional ROW
Jimmy Carter at Buford Highway CFI

- 2 Leg CFI along Buford Highway
Reduced Impacts & Cost
CFI vs. Compact Interchange
Reduced Impacts & Cost
CFI vs. Compact Interchange
Constrained Funding

- Compare benefit & cost of options
- Innovative intersections can often be cheaper and require less ROW
- May accept lower traffic LOS with significantly lower costs
### “Constrained Funding” Case Studies

<table>
<thead>
<tr>
<th>Improvement Type and Location</th>
<th>Cost</th>
<th>Percent Savings</th>
<th>Better Traffic Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Innovative</td>
<td>Traditional</td>
<td></td>
</tr>
<tr>
<td>CFI</td>
<td>$12,000,000</td>
<td>$100,000,000</td>
<td>88%</td>
</tr>
<tr>
<td>SR 400 at SR 53 CFI - Dawson County, GA</td>
<td>$8,000,000</td>
<td>$60,000,000</td>
<td>87%</td>
</tr>
<tr>
<td>US 78 at SR 124 - Snellville, GA</td>
<td>$8,200,000</td>
<td>$44,900,000</td>
<td>82%</td>
</tr>
<tr>
<td>Jimmy Carter at Buford Highway CFI - Norcross, GA</td>
<td>$4,000,000</td>
<td>$79,000,000</td>
<td>95%</td>
</tr>
<tr>
<td>DDl</td>
<td>$3,500,000</td>
<td>$3,300,000</td>
<td>-6%</td>
</tr>
<tr>
<td>I-85 at Jimmy Carter Blvd - Norcross, GA</td>
<td>$18,000,000</td>
<td>$46,000,000</td>
<td>61%</td>
</tr>
<tr>
<td>Roundabout Interchange</td>
<td>$700,000</td>
<td>$900,000</td>
<td>22%</td>
</tr>
<tr>
<td>Roundabout</td>
<td>$3,700,000</td>
<td>$1,600,000</td>
<td>-133%</td>
</tr>
<tr>
<td>Lower Roswell Road/Davidson Rd – Cobb Co, GA</td>
<td>$700,000</td>
<td>$100,000</td>
<td>-700%</td>
</tr>
</tbody>
</table>
Support

- Develop support for project from:
  - Public agencies
  - Elected officials
  - Community
- Requires a “champion” for the project
Grimes Bridge Road at Warsaw Road/Norcross Street Roundabout

- **Purpose of the Project**
  - 20,000 ADT – Design Year
  - Minimal turn lanes
  - High crashes
  - High peak hour delays
  - Five-leg intersection
3D Rendering for Public Outreach vs. Actual
Roswell uses roundabout way to solve traffic woes

If you have had the pleasure of driving through the Roswell intersection of Grimes Bridge Road and Norcross Street in the last few months, then you have seen the city’s amazing new answer for the traffic bottlenecks that seem to abound in Roswell.

It is called a roundabout, and once you have driven one, you know why. Instead of the usual crossroads with a signal in the middle, a roundabout is a circle in which all traffic turns are right turns and the flow is counterclockwise.

I knew the Roswell City Council had fallen absolutely in love with the idea of roundabouts, but I was skeptical of road rage FIVE (sorry, I still have a thing for FIVE). The intersection of Grimes Bridge Road and Norcross Street before construction.

The intersection with the roundabout in place.

“...then you have seen the city’s amazing new answer for the traffic bottlenecks that seem to abound in Roswell.”
Many opponents seem to have come around in support of north Fulton’s first public roundabout.
What is the public response to roundabouts?

<table>
<thead>
<tr>
<th>Attitude</th>
<th>Before Construction</th>
<th>After Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Negative</td>
<td>23%</td>
<td>00%</td>
</tr>
<tr>
<td>Negative</td>
<td>45%</td>
<td>00%</td>
</tr>
<tr>
<td>Neutral</td>
<td>18%</td>
<td>27%</td>
</tr>
<tr>
<td>Positive</td>
<td>14%</td>
<td>41%</td>
</tr>
<tr>
<td>Very Positive</td>
<td>0%</td>
<td>32%</td>
</tr>
</tbody>
</table>
## City of Roswell, GA Survey

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did the roundabout improve safety?</td>
<td>54%</td>
<td>23%</td>
<td>14%</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Did the roundabout improve traffic operations?</td>
<td>70%</td>
<td>18%</td>
<td>5%</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>Do you view this roundabout as successful?</td>
<td>68%</td>
<td>19%</td>
<td>6%</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>Agreeable with other roundabouts in City?</td>
<td>67%</td>
<td>18%</td>
<td>4%</td>
<td>3%</td>
<td>7%</td>
</tr>
</tbody>
</table>

Source: City of Roswell Survey via email newsletter, Twitter and Facebook. 742 responses – 99% had driven through the roundabout
Access

- Determine impacts to access to adjacent properties
- Develop access management plan for adjacent properties:
  - Land use
  - Property owners
  - Other access locations
  - New access locations
Access issues: Properties Adjacent To CFI Most Impacted
Access issues: Cross Over Legs add Additional Median
Access issues: Right Turns In From Mainline
Pedestrians & Transit

- Determine level of pedestrian and transit activity that needs to be accommodated
- Some solutions require multi-stage pedestrian crossings
- Transit stops may need to be relocated upstream or downstream from intersection
“Pedestrian & Transit” Case Study

- US 78 at SR 124 CFI – Norcross, GA
Existing Gwinnett County Transit Bus Lines

<table>
<thead>
<tr>
<th>Existing Bus Route Layout</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Key</strong></td>
</tr>
<tr>
<td>Route 10</td>
</tr>
<tr>
<td>Route 35</td>
</tr>
<tr>
<td>Route 20</td>
</tr>
</tbody>
</table>
Proposed Gwinnett County Transit Bus Lines

<table>
<thead>
<tr>
<th>Proposed Bus Route Layout</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route 10</td>
<td>green line</td>
</tr>
<tr>
<td>Route 35</td>
<td>red line</td>
</tr>
<tr>
<td>Route 20</td>
<td>blue line</td>
</tr>
</tbody>
</table>
Bus Stop Locations
In Summary...

- Keep It Simple
- Consider the 6 criteria
  - Need
  - Geometry
  - Constrained Funding
  - Support
  - Access
  - Pedestrian & Transit