

Modern Roundabouts in Florida



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Florida Roundabouts – Presentation Topics

- ◆ Florida DOT Policy
- ◆ Florida DOT Manuals and Guidelines
- ◆ Considerations and Evaluation of Roundabouts at the Conceptual Phase
- ◆ Roundabout Examples



The agenda for today is an update of FDOT policy for roundabouts, a status of our manuals and guidelines, then Justin will discuss the evaluation of roundabouts and include some examples.

Florida Roundabouts – Florida DOT Policy

- ◆ Plans Preparation Manual, Volume 1
 - ✓ Section 2.13 - Intersections
 - ✓ “Roundabouts ***shall*** be evaluated on new construction, reconstruction and safety improvement projects, as well as anytime there are proposed changes in intersection control that will be more restrictive than the existing conditions.”



- With the January 2013 publication of the PPM, Chapter 2 was updated to include policy on roundabouts. (read)
- New Construction/ Reconstruction projects are fairly straightforward.
- Safety projects because the safety performance of roundabouts can be significantly better than conventional intersections, especially when talking about crash severity.
- ‘More restrictive intersection control’ can be adding signal control, or even full stop control.

Florida Roundabouts – Florida DOT Policy



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- New Construction/ Reconstruction – does that mean that you have to evaluate every intersection and maybe end up with a project that looks like this one on the left? Possibly.
- If only one intersection is a viable roundabout location, is that OK?

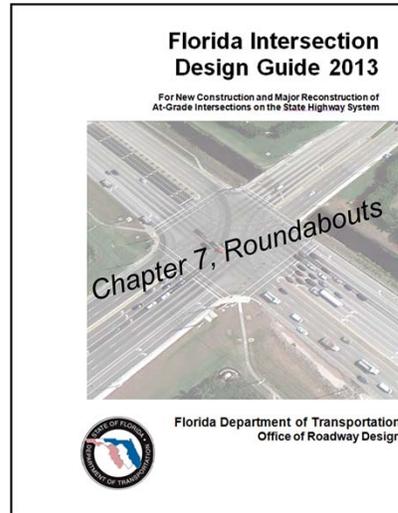
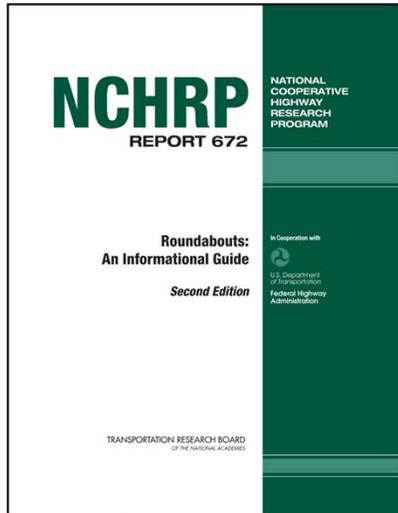
Florida Roundabouts – Florida DOT Policy



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Or, maybe just one big roundabout is the solution? Well, obviously roundabouts are not the solution in every case, and we don't have clear answers to all these questions because some factors, like public acceptance, is more subjective than the technical evaluation. But we hope that this presentation you will have a better understanding of how to approach the implementation of roundabouts on your project.

Florida Roundabouts – Florida DOT Manuals & Guidelines



While Department policy is set forth in the PPM, the primary supporting documents for Designers and Planners are:

- NCHRP Report 672/ adopted by Federal Highways and the FDOT as the primary resource for roundabout evaluation and design guidelines and,
- The Florida IDG as a supporting document. Chapter 7 was recently added to address 'Florida Centric' issues.

*Florida Roundabouts – Florida DOT
Manuals & Guidelines*

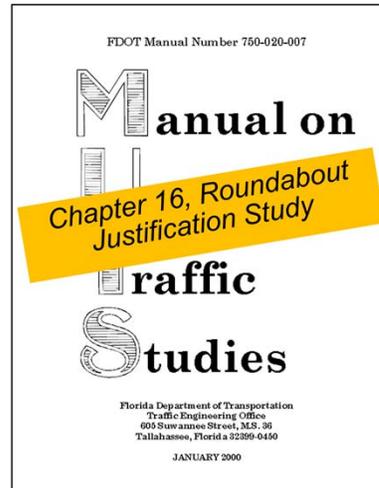
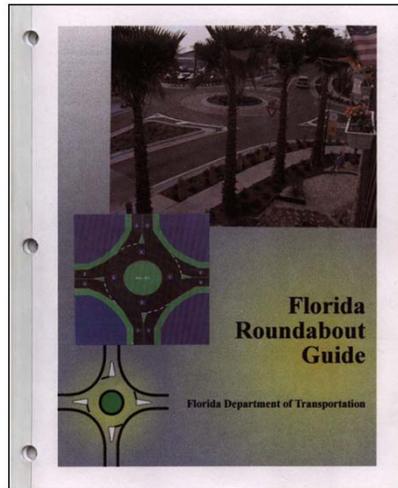
FIDG, Chapter 7

- ◆ Screening Checklist
- ◆ Design Vehicle & Operational Analyses
- ◆ Size Restriction (2-lane max.)
- ◆ Lighting
- ◆ Landscape



Some Florida Centric issues addressed in the IDG include: (read list)

Florida Roundabouts – Florida DOT Manuals & Guidelines



-With the adoption of NCHRP 672, the original Florida Roundabout Guide was taken offline and sunset.

- A new MUTS Manual update is about to be published and with it, Chapter 16 titled “Roundabout Justification Study” is being removed.

Florida Roundabouts Invitation to Innovation Web-site

FDOT promotes Roundabouts as an Innovative Design



- The invitation to innovation websites are published by the various Design Offices to promote new and innovative technology that the Department wants to promote. Designers and Contractors should review these sites periodically and look for opportunities to implement these technologies. On the Roadway Design innovative web site you will find roundabouts.

Florida Roundabouts

FHWA Proven Safety Countermeasure

- ◆ Can reduce fatal and injury crashes in the range of 60-87 percent.
- ◆ Medium to high cost countermeasure.
- ◆ Should be considered for:
 - ✓ All new intersections on Federally-funded highway projects.
 - ✓ Existing intersections identified as needing major safety or operational improvements.



Roundabouts are a Federal Highways Proven Safety Countermeasure.

Roundabouts are a medium to high cost countermeasure to implement. This can be due to the need for additional right-of-way than previously needed at the intersection. However, the reduction in serious crashes can easily justify the cost if the intersection was experience a crash problem. They have been shown to reduce fatal and injury crashes in the range of 60-87 percent.

Roundabouts can be an effective tool for managing speed and transitioning traffic from a high speed to a low speed environment. Proper site selection and channelization for motorists, bicyclists, and pedestrians are essential to making roundabouts accessible to all users.

Roundabouts are the preferred safety alternative for a wide range of intersections.

Florida Roundabouts – BLUF

- ◆ Challenges with Public Perception/ Education
- ◆ Challenges with Local Agency Perception/ Education
- ◆ Barriers have been removed/ the Department is moving forward with Modern Roundabouts
- ◆ The Design Community needs to ‘Step Up’



There are still going to be challenges with Public Perception and local acceptance, but these challenges can be successfully overcome through a good public involvement and education program. There are plenty of success stories around the country to draw from.

So, with the publication of our policy and guidelines, we are asking designers to step up and take the challenge.

Now I'll turn this over to Justin.

Potential Roundabout Applications

- ◆ Important to consider the context of the intersection
 - ✓ Location
 - New roadway system?
 - Retrofit to existing intersection?
 - ✓ Local history
 - First roundabout in an area?
 - Roundabouts have gained acceptance?
 - ✓ Area type and vehicle speed
 - Urban vs rural
 - Low speed vs higher speed environment



- New Roadway:
 - Fewer Constraints
 - ROW easier to acquire:
- First Roundabout in Area:
 - More effort towards gaining community and institutional support.
 - More extensive justification effort may be necessary to gain the required support;
 - More cautious and conservative approach may be appropriate
 - Single-lane roundabout in the near-term is more easily understood.
 - Choice of design and analysis procedures could set a precedent for future roundabout implementation.
 - After the roundabout is constructed, evaluating its operation and the public response could provide documentation to support future installations.
- Retrofit
 - Is minimum configuration adequate?
 - Is existing ROW sufficient?
 - Can single-lane be upgraded in future to accommodate growth.

Variety of Roundabout Uses



Residential Subdivisions -
Modesto, California



Small Towns -
Howard, Wisconsin



Urban Centers -
Towson, Maryland



High-Speed Rural Roadways -
Paola, Kansas

Photos: Lee Rodegerdts



Variety of Roundabout Uses (cont.)

Tourist Routes –
Astoria, Oregon



Large Developments –
South Jordan, Utah



Northern Climates –
North Pole, Alaska



Near Schools –
Clearwater, Florida



Photos: Lee Rodegerdts



Closely Spaced Intersections

- ◆ Can be more efficient than conventional alternatives



Photo: New York State DOT

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Environmental Benefits

- ◆ Generally lower fuel consumption and emissions
- ◆ Less impervious surface



Photo: Clackamas County, OR

Land Use Boundary Definition



Commercial w/
angle parking

Residential

Photo: City of Clearwater, FL



Access Management

- ◆ Use roundabouts at major intersections to facilitate U-turns
- ◆ Allow restricted access at intermediate access points



Photo: City of Golden, CO

Aesthetics and Community Enhancement

- ◆ Can be a visual anchor to a community



Photo: Lee Rodegerdts



Photo: Joe Bared



*Gateway in Major Tourist Area:
Clearwater, FL*



Photo: Lee Rodegerdt

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Interchange - MD 216, Scaggsville, MD



*Interchange and Tourist Corridor –
Avon Road, Avon, CO*



Photo: Lee Rodegerdt



Roundabout Feasibility Evaluations

- ◆ Planning-level evaluation
- ◆ Identify needed lane configurations and potential footprint
- ◆ Review potential benefits and impacts
- ◆ What might be included in a feasibility study?
 - ✓ Initial screening
 - ✓ Operational assessment
 - ✓ Safety considerations
 - ✓ Conceptual geometric design evaluation
 - ✓ Concept-level review of impacts

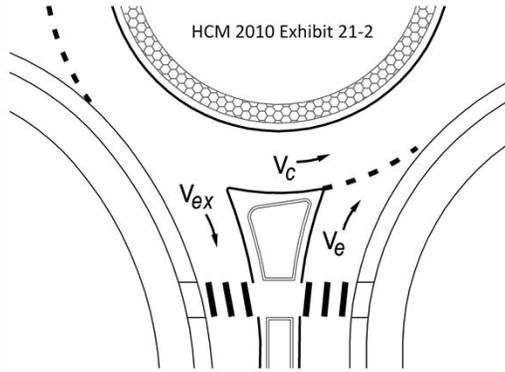


Initial Screening

- ◆ Define the purpose of the intersection improvement
- ◆ Review potential lane configurations based upon existing intersection turning movement volumes
 - ✓ Single-lane or mini-roundabout
 - ✓ Multilane
- ◆ High-level review of opportunities and constraints
 - ✓ Adjacent land uses
 - ✓ Proximity to existing structures
 - ✓ Historical or environmental constraints



Planning Level Volume Thresholds



Sum of Entering Plus Conflicting Flows (veh/h)	Number of Lanes Required
0 – 1,000	1 lane likely ok
1,000 – 1,300	1 lane might be ok 2 lane may be needed
1,300 – 1,800	2 lane likely ok
> 1,800	More than 2 lanes may be needed

NCHRP Report 672 Exhibit 3-14

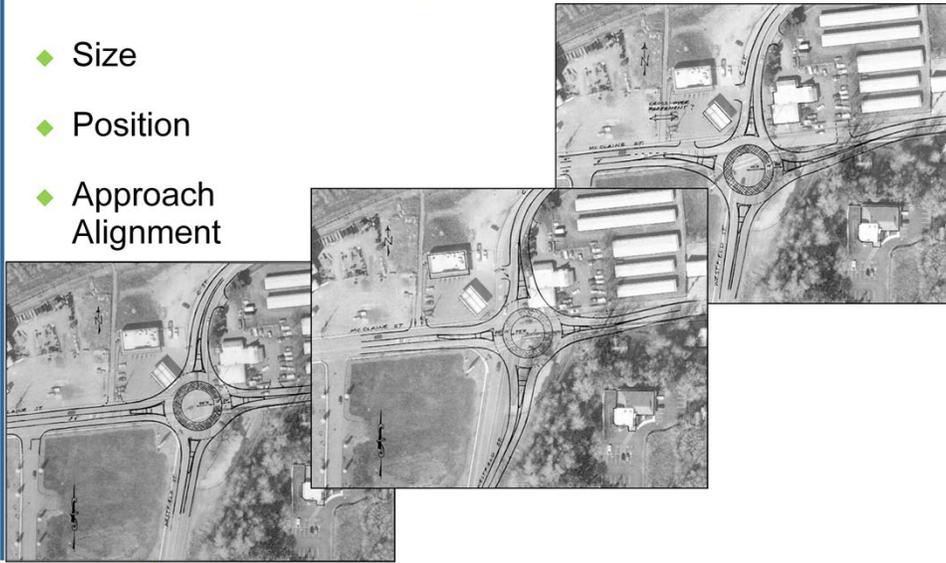
Conceptual Design Development

- ◆ Principle-based approach (performance-based design)
- ◆ Recognizes roundabouts, as with any intersection treatment, requires the balancing of competing objectives
- ◆ Flexibility is provided to encourage independent designs and techniques
 - ✓ Tailored to particular situations
 - ✓ Emphasizes performance-based evaluation of designs
 - ✓ Allows development of new techniques
- ◆ More than one way to achieve an acceptable design



3 Basic Initial Design Considerations

- ◆ Size
- ◆ Position
- ◆ Approach Alignment



Roundabout Size Comparison

Design Element	Mini-Roundabout	Single-Lane Roundabout	Multilane Roundabout
Desirable maximum entry design speed	15 to 20 mph (25 to 30 km/h)	20 to 25 mph (30 to 40 km/h)	25 to 30 mph (40 to 50 km/h)
Maximum number of entering lanes per approach	1	1	2+
Typical inscribed circle diameter	45 to 90 ft (13 to 27 m)	90 to 180 ft (27 to 55 m)	150 to 300 ft (46 to 91 m)
Central island treatment	Fully traversable	Raised*	Raised*
Typical maximum service volumes	≤15,000 veh/day	≤25,000 veh/day	≤45,000 veh/day

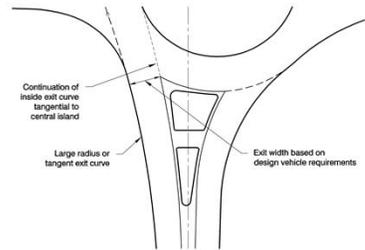
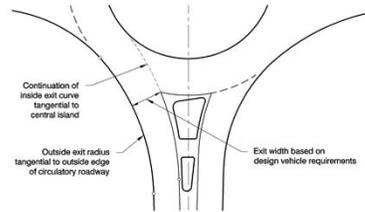
* (may have traversable apron)

NCHRP Report 672, Exhibit 1-9



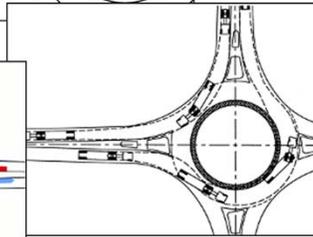
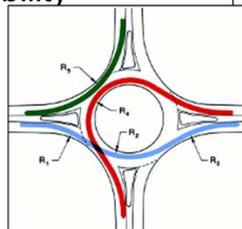
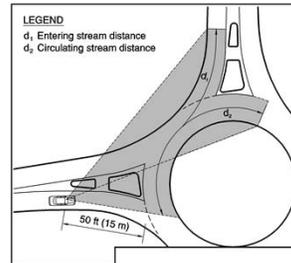
Approach Alignment

- ◆ Offset left, radial, and offset right each have their place
- ◆ Each circumstance requires its own solution, with principles determining tradeoffs



Roundabout Design is Principles Based

- ◆ Fastest path
- ◆ Path alignment
- ◆ Design vehicle
- ◆ Non-motorized design users
- ◆ Sight distance and visibility
- ◆ Visibility/view angles



Fastest Path

- ◆ Emphasis on controlling entry speed
- ◆ Suggested maximum theoretical speeds
 - ✓ Single lane: 25 mph
 - ✓ Multilane: 25-30 mph



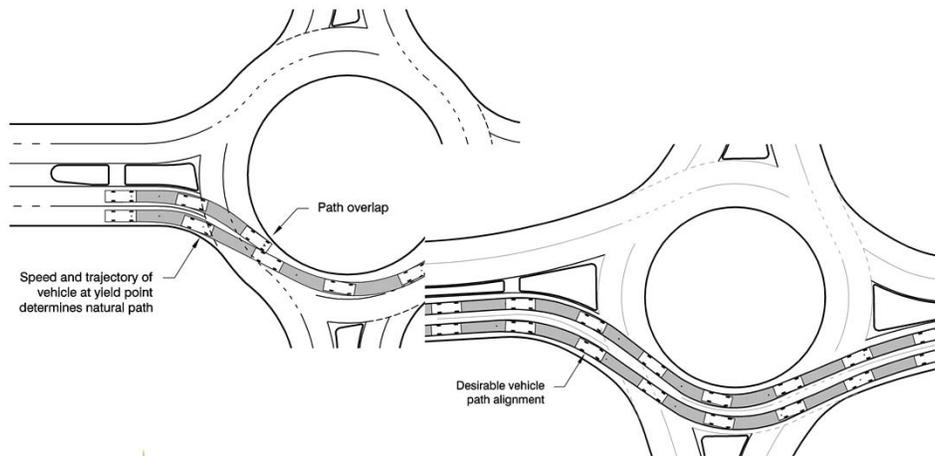
Design Vehicle

- ◆ Considered during earliest planning stages



Path Alignment

- ◆ Aim vehicles before entering conflict areas



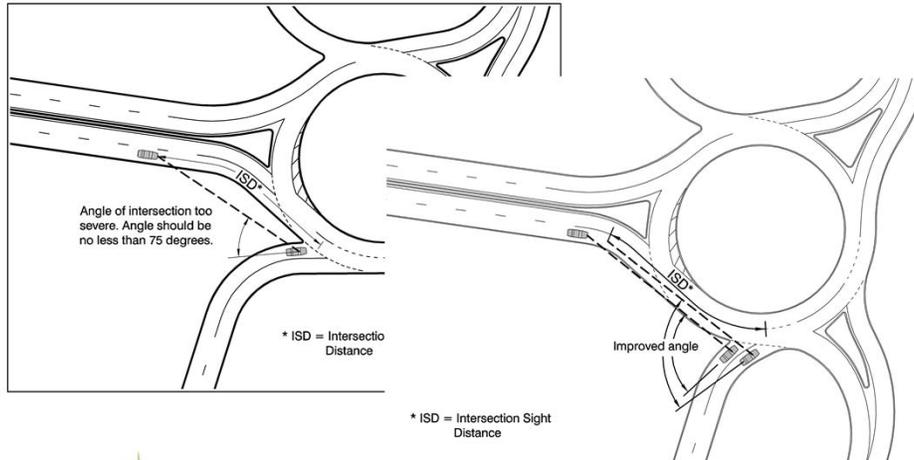
Non-motorized Design Users

- ◆ Pedestrians of all abilities, bicyclists of all abilities
- ◆ Integrate into design process
- ◆ User dimensions affect key roundabout dimensions
 - ✓ Splitter island width
 - ✓ Crossing width
 - ✓ Crossing location
 - ✓ Sidewalk width



Visibility/View Angles

- ◆ Need to consider human factors when looking to left



Signing and Markings



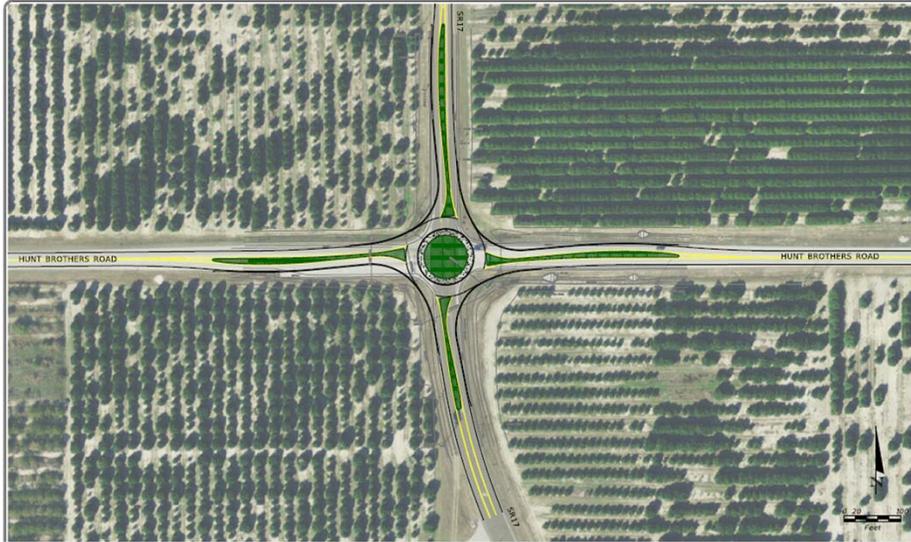
SW Stafford Rd at SW Borland Rd, Clackamas County, OR

The Art of Putting It All Together

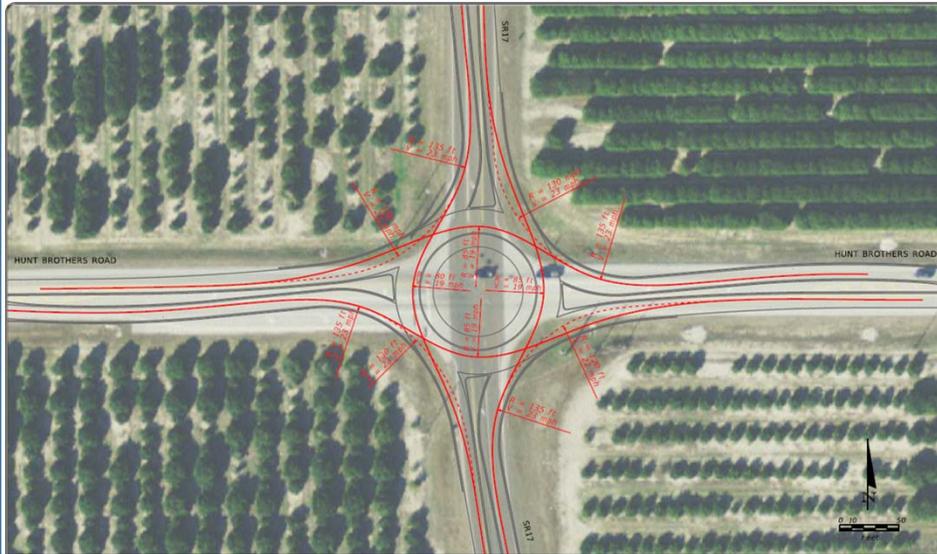
- ◆ Three fundamental components to horizontal layout:
 - ✓ Size and shape of the roundabout
 - ✓ Location of the central island
 - ✓ Alignment of approaches
- ◆ No one combination is appropriate for every circumstance
- ◆ Principles and design checks used to determine suitability of given design



Roundabout Feasibility Sample



Sample Design Checks



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Sample Design Checks



Sample Design Checks



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