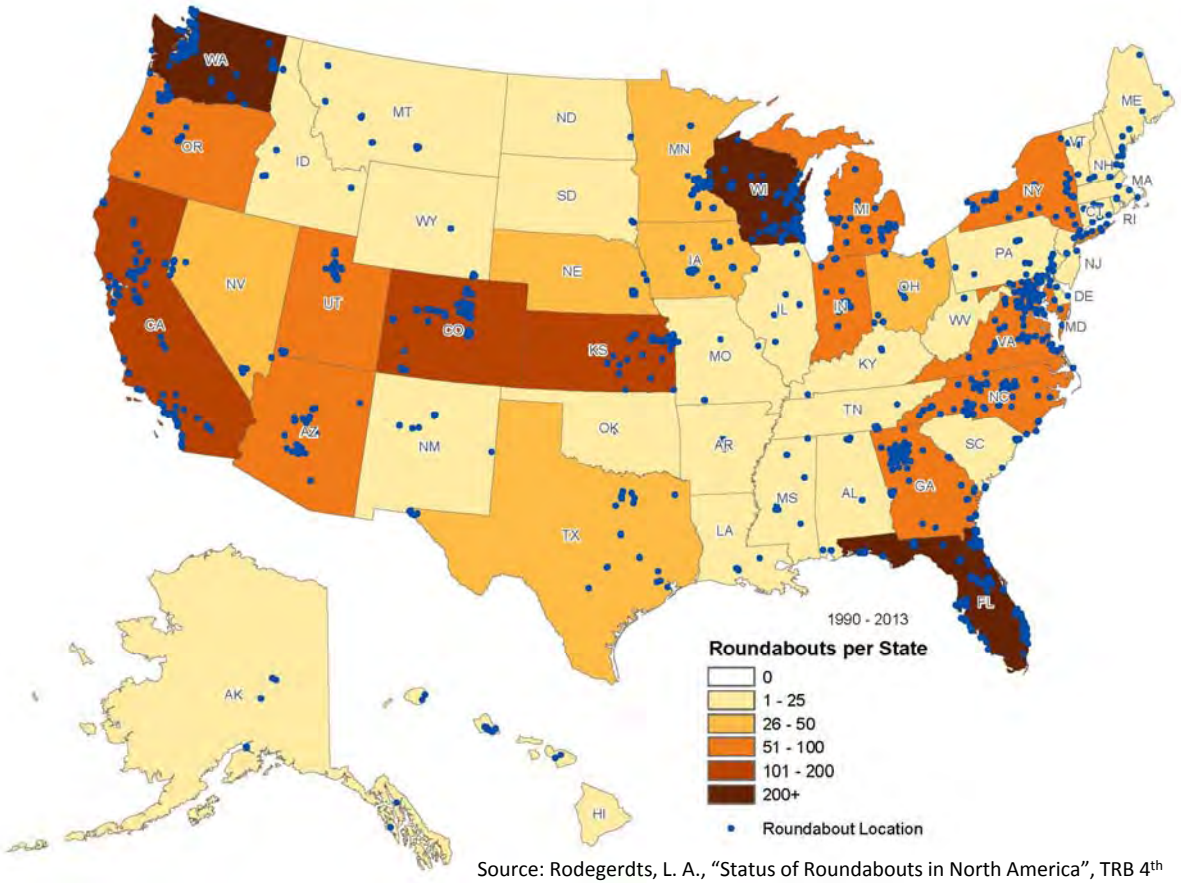
Roundabouts Overview

A presentation to MetroPlan Orlando

Over 25 Years of US Roundabout Experience

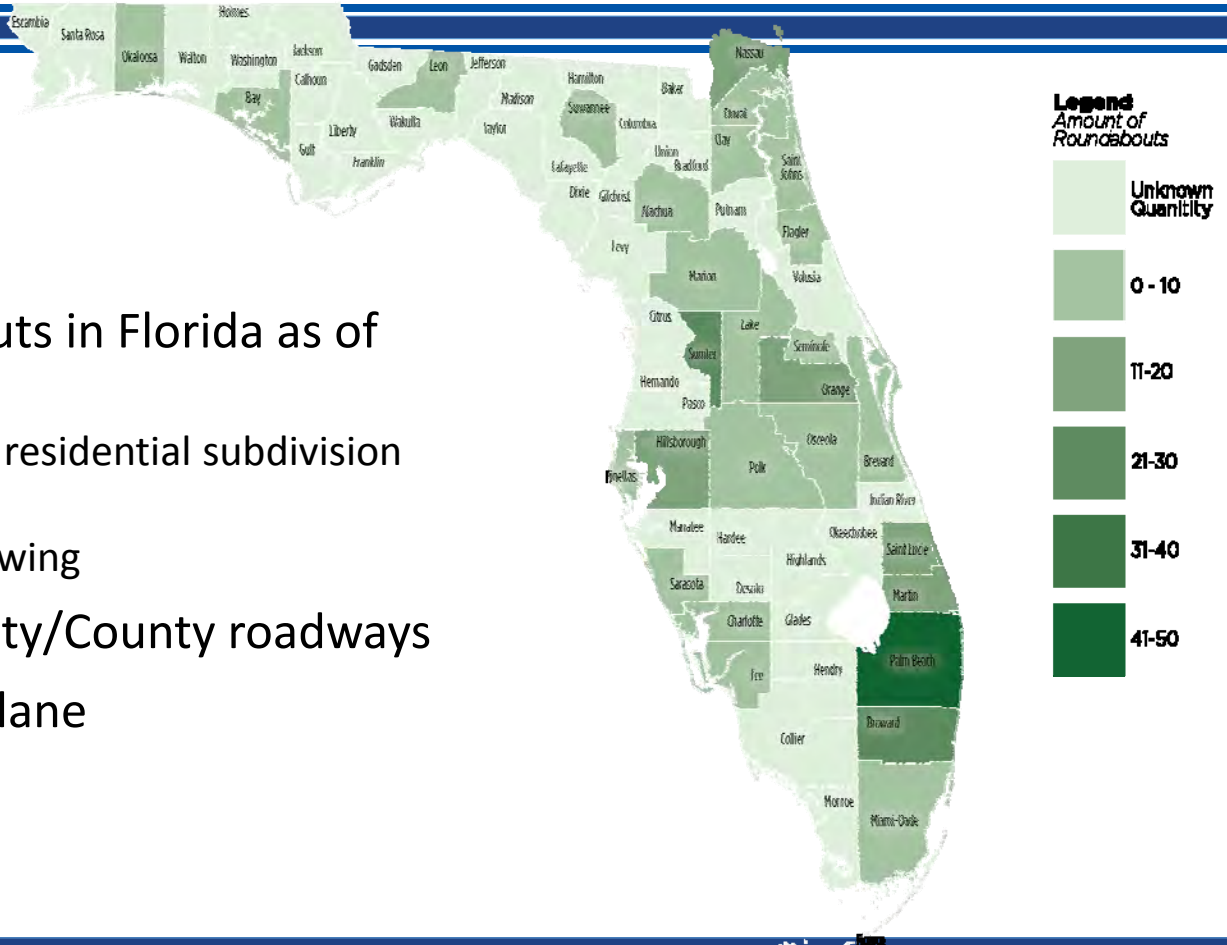
- Roundabouts currently operate in every state in the U.S.
- Roundabouts have been constructed in a wide variety of applications:
  - Residential subdivisions
  - Urban Centers
  - Suburban/small towns
  - Commercial areas
  - Rural intersections
  - Freight Routes
  - Near schools, fire-stations, hospitals
  - Interchanges
  - Closely spaced intersections



Source: Rodegerdts, L. A., "Status of Roundabouts in North America", TRB 4th International Conference on Roundabouts, Seattle, WA, April 2014.

Overview of Florida Roundabout Experience

- Over 300 Existing Roundabouts in Florida as of 2014
  - Does not account for all small residential subdivision roundabouts
  - Rate of implementation is growing
- Approximately 95% are on City/County roadways
- 75% Single-Lane / 25% Multilane



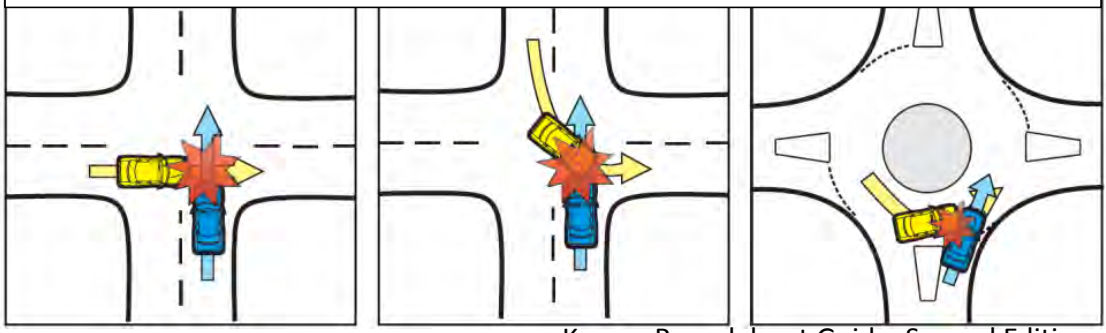
Why Roundabouts?

- Safer than signalized or stop controlled intersections
  - 35% reduction in ALL crashes
  - 76% reduction in INJURY crashes
- Reduces delay, improves traffic flow
- May reduce need for widening a road or adding turn lanes
- Reduced emissions and wasted fuel
- Better aesthetics/ landscaping options
- Supports access management
- Supports multimodal enhancements

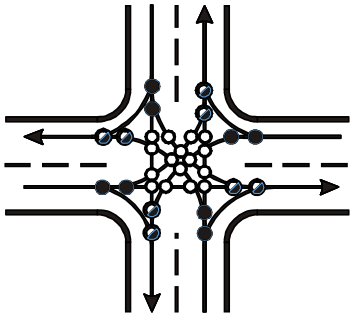
Roundabout Safety

- Roundabouts are one of FHWA's 9 Proven Safety Countermeasures
- Roundabouts have a proven safety record in the U.S. for reducing motor vehicle crashes, particularly injury crashes
- Safety benefits include:
  - Reduced vehicle speeds
  - Reduced driver decisions
  - Reduced conflict points
  - Reduced severity of conflicts

Crash Severity Reduced



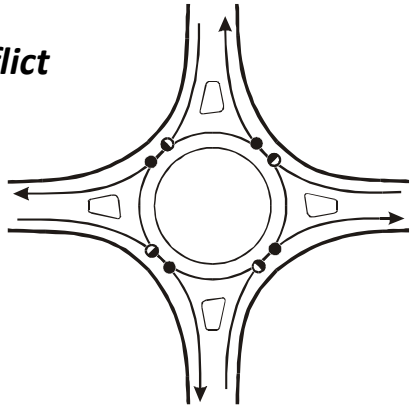
Kansas Roundabout Guide, Second Edition



NCHRP Report 672, Exhibit 5-2

Number of Conflict Points Reduced

- Merging
- Diverging
- Crossing



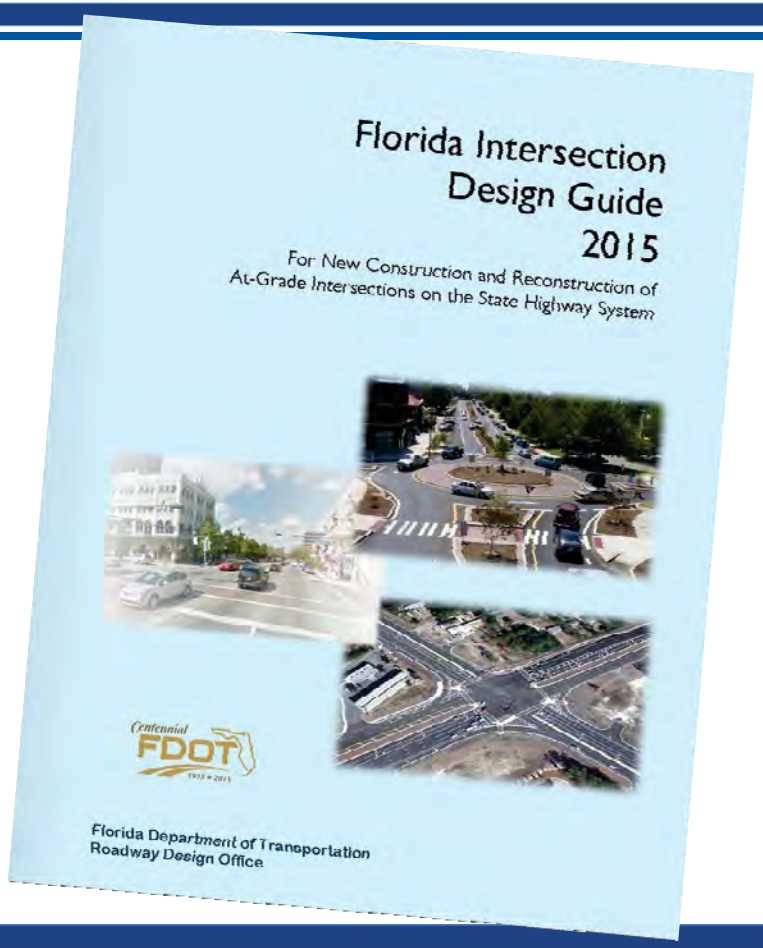
Current FDOT Roundabout Policies

- Plans Preparation Manual, Volume 1, Chapter 2
  - Section 2.13 - Intersections

  "***A roundabout alternative must be evaluated on new construction and reconstruction projects.*** An evaluation is also required for all other types of projects that propose new signalization or require a change in an un-signalized intersection control…"
- Florida Intersection Design Guide (2015 Edition)
  - Section 2.2.3 – Traffic Control Modes

  "Due to substantial safety characteristics, and potentially significant operational and capacity advantages, ***the modern Roundabout traffic control mode must be considered for any new road or reconstruction project***…"

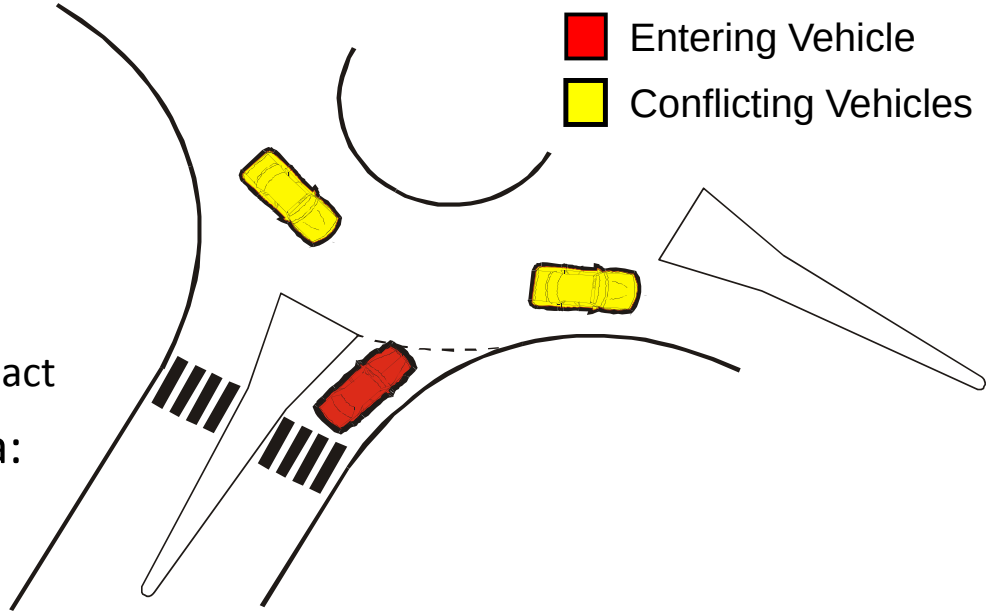
3-Step Roundabout Screening



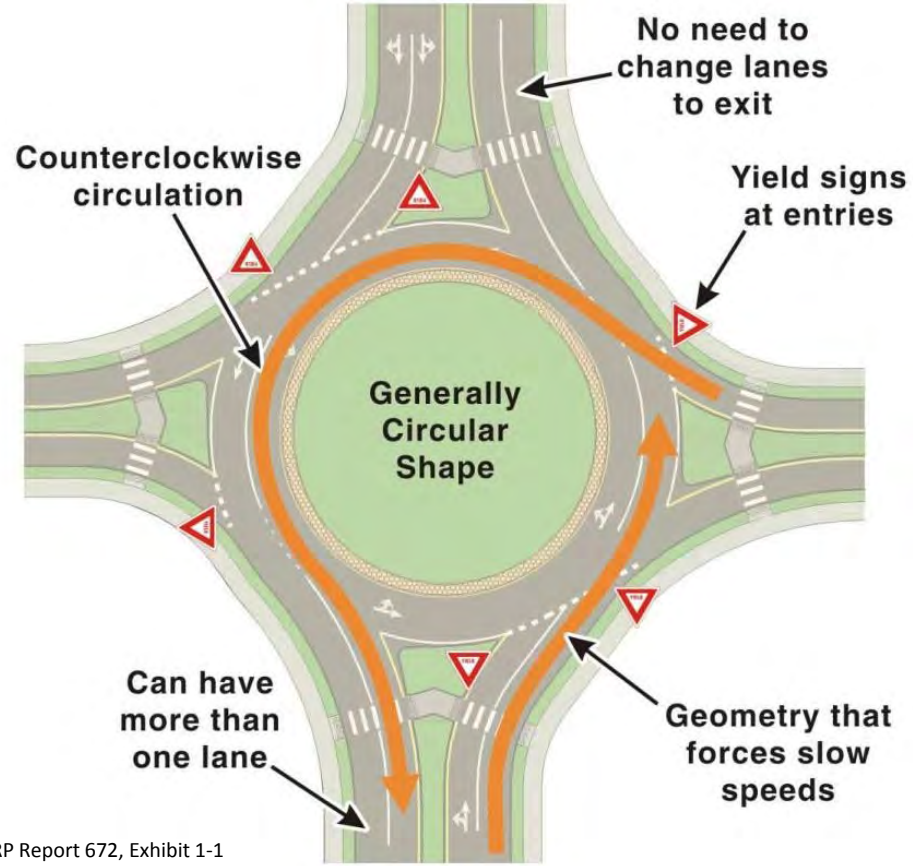
- **Step 1: 1-Page Initial Screening Form**
- **Step 2: Planning-Level Benefit/Cost Analysis**
  - Excel spreadsheet tool
  - Is a roundabout expected to be a cost-effective solution?
- **Step 3: Operational and Geometric Evaluation**
  - Detailed operations analysis
    - Opening year and 20-year horizon
  - Develop concept design
  - Geometric performance checks
    - Speed Control
    - Accommodate design vehicles
    - Provide appropriate sight distance
    - Provide appropriate multimodal accommodations

Roundabout Operations

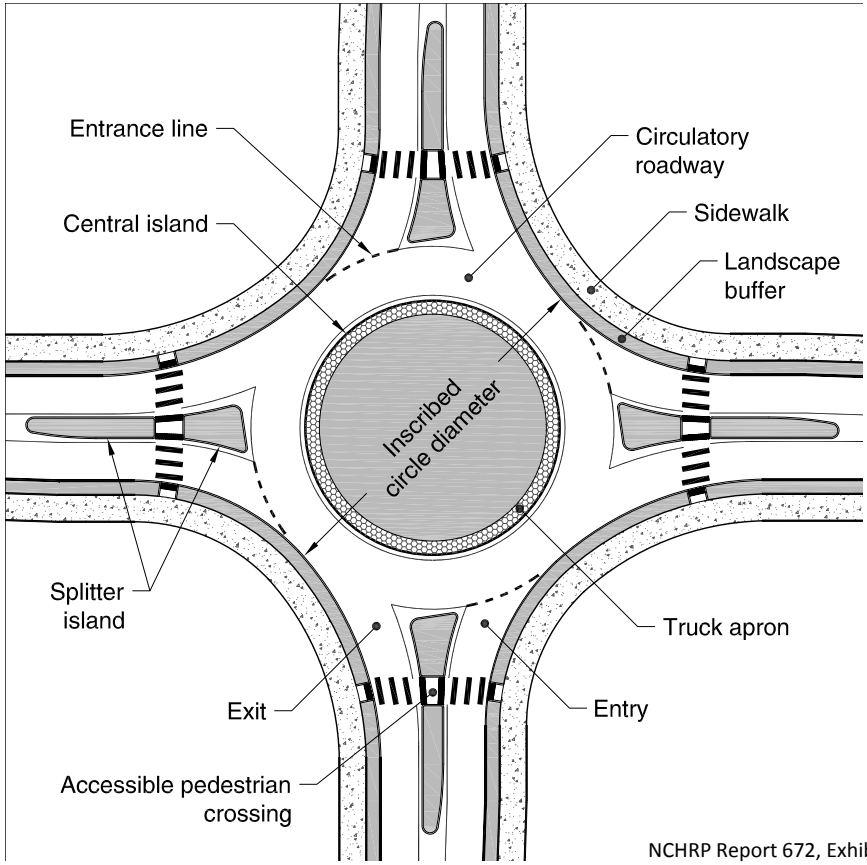
- Planning Rule of Thumb (total entering volume):
  - Single-Lane: up to ~25,000 AADT
  - Two-Lane: up to ~45,000 AADT
- Each individual entry has a unique capacity
  - Number of conflicting vehicles has significant impact
- Common roundabout analysis tools in Florida:
  - Highway Capacity Software
  - SIDRA
- Highway Capacity Manual (HCM) 6th Edition soon to be released
  - Contains latest US roundabout capacity model



Basic Geometric Elements of a Roundabout



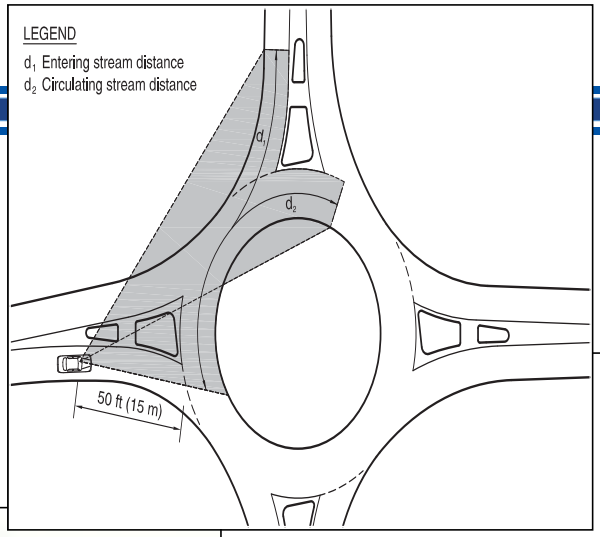
NCHRP Report 672, Exhibit 1-1

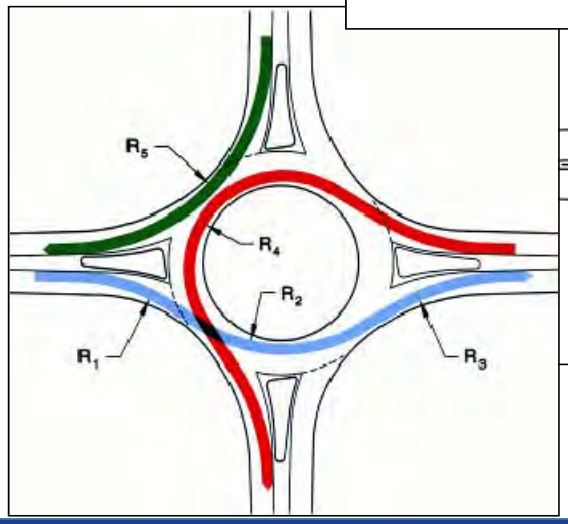


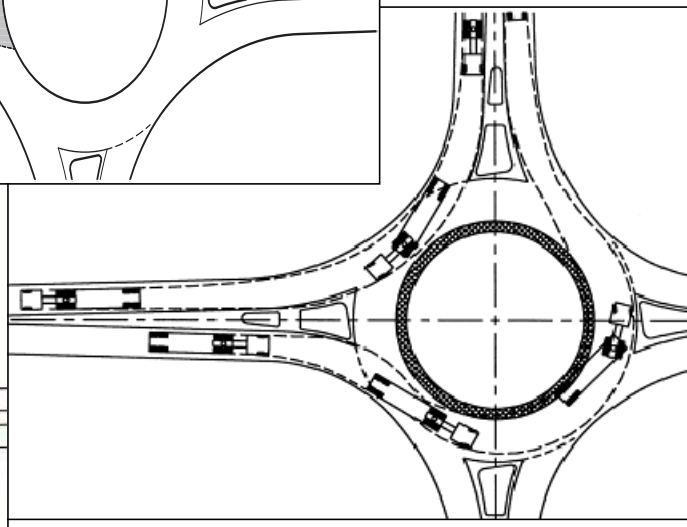
NCHRP Report 672, Exhibit 6-2

Roundabout Design: Emphasis on Principles

- Iterative principle-based process
  - Balancing design trade-offs within site constraints
- Design checks performed to verify:
  - Slow and consistent fastest path speeds
  - Accommodation of design vehicles
  - Appropriate sight distance and visibility
  - Appropriate vehicle alignment and channelization
  - Appropriate features for pedestrian and bicycle users
- NCHRP Report 672 serves as FDOT's roundabout design guide







Source: NCHRP Report 672

Roundabout Design: Multimodal Considerations

- Pedestrian
  - Slow vehicle speeds enhance safety
  - Splitter island refuge minimizes crossing distance
  - Cross one direction of traffic at a time
  - Additional considerations for visually impaired
- Bicycle
  - Options for navigating through roundabout or exiting onto an adjacent multiuse path depending on skill level or comfort
- Multimodal features integral to roundabout design process

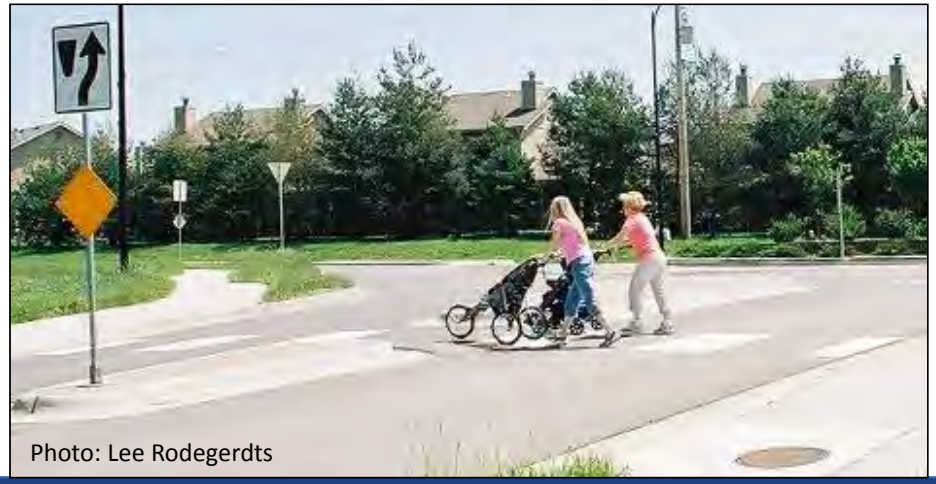


Photo: Lee Rodegerdts

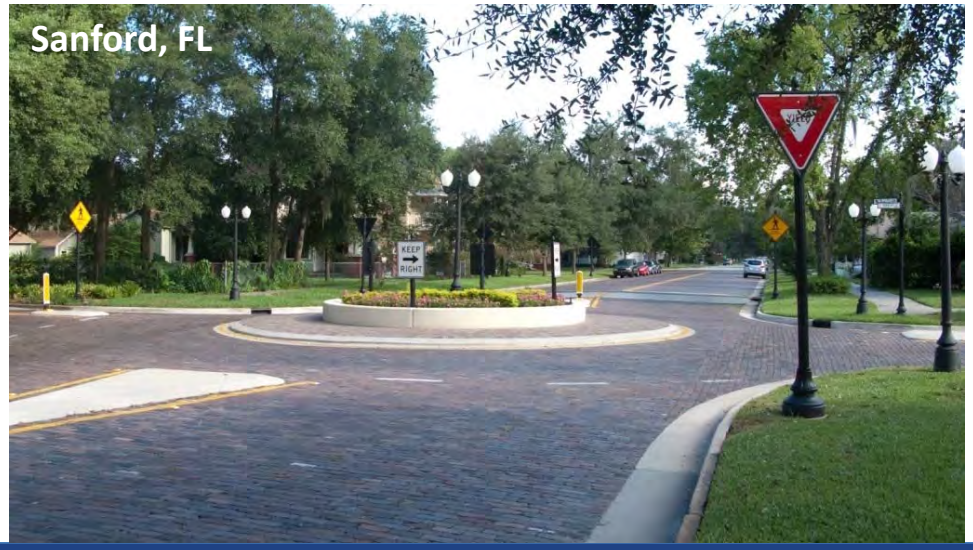
Design Directly Impacts Safety and Operations

- Roundabout design is more than just drawing a circle
- NCHRP 672 provides typical ranges of dimensions
- The overall composition of the design impacts performance.
  - Yield rates
  - Speeds
  - Vehicular conflicts
  - Capacity

Photo: Lee Rodegerdts

Florida Roundabout Trends to Date

- Previous implementation focused in urbanized areas
  - Local residential streets (small/mini roundabouts)
  - City/County collector and arterial streets
- Several recent roundabouts successfully implemented on rural facilities
- Local agencies play a strong role in implementation
  - Heavier concentrations of roundabouts in areas with a local champion



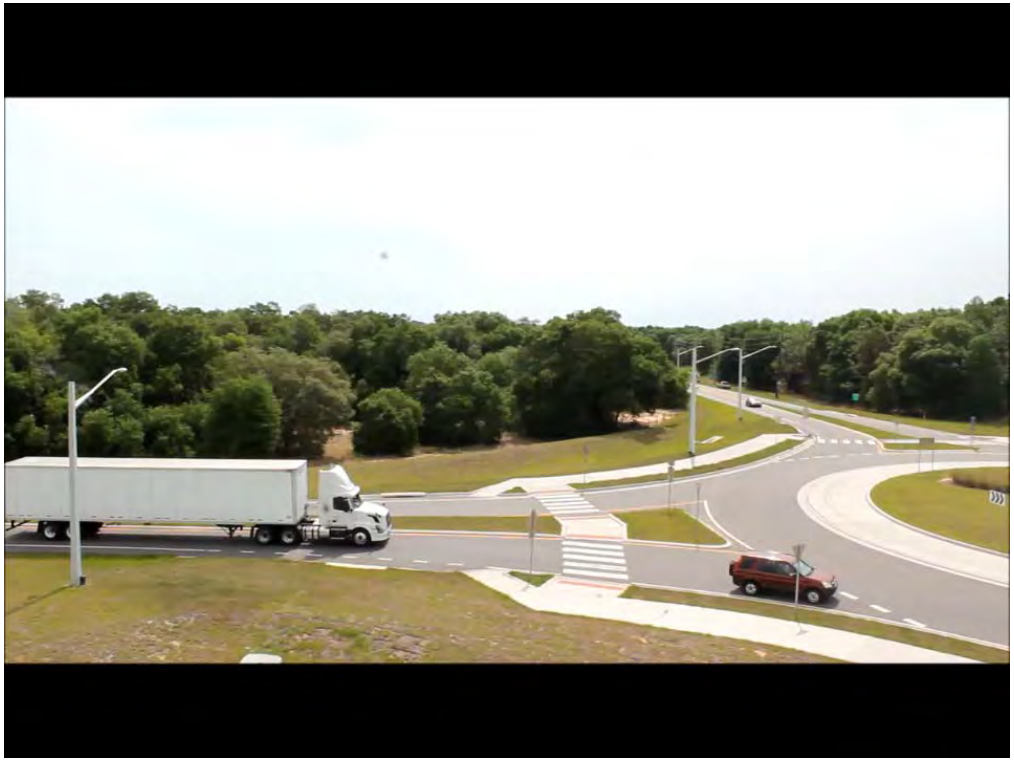
Roundabouts in Rural Environments

- Proven safety benefits at rural intersections
- Proven truck accommodation
- Proven compatibility with high speed roadways
  - Additional considerations to transition speeds

Lake County,
County Road (CR) 561 and CR 455

- From 2002-2012:
  - 32 crashes (3.2 crashes per year)
  - 2 fatalities
- Roundabout opened in June 2015
- In first year of operation, there were ***no reported crashes*** (per Lake County Public Information)

Lake County,
County Road (CR) 561 and CR 455



Questions and Follow-Up

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