ROUNDABOUTS

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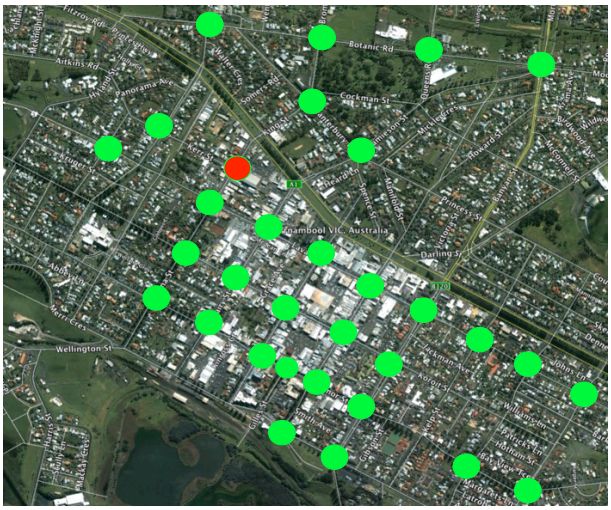
Topics

- Roundabouts what are they and why use them?
- Roundabout safety
- Pedestrians and bicyclists
- Roundabout design – the good, the bad and the ugly

Uses

- Replace signals and stop control
- Reduce the number of vehicle lanes
- Fix dysfunctional intersections, skewed, 5 or more leg intersections
- Create a focal point, a town center
- Provide transit priority
- Etc., all you need is imagination

Downtown Warnambool, Victoria, Australia, 38 roundabouts



Population 34,600

Clearwater Beach

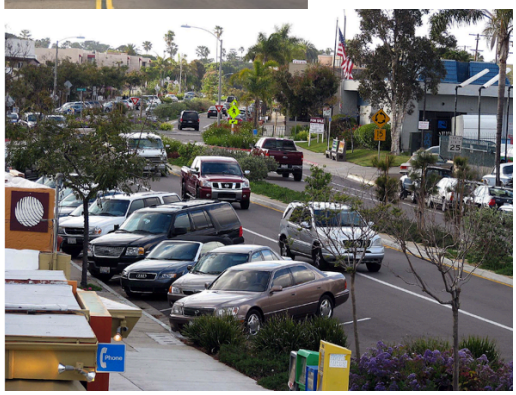
From 8 to 4 lanes, with three signalized intersections

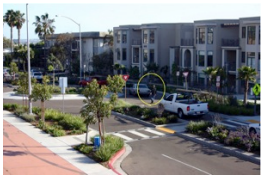
To a 6 leg, two lane roundabout

58,400 vehicles, 6,000 pedestrians, 350 bicyclists in one day

Road Diet - 5 to 2 lanes
La Jolla Boulevard San Diego, CA 22,000 vpd

Using 5 one lane roundabouts
Travel speed 15 to 20mph along corridor





Five-leg Signalized Intersection to a Six-leg Roundabout

LOS with signals - F

LOS after - B (Friday 5.15 PM)

Small

Outstanding

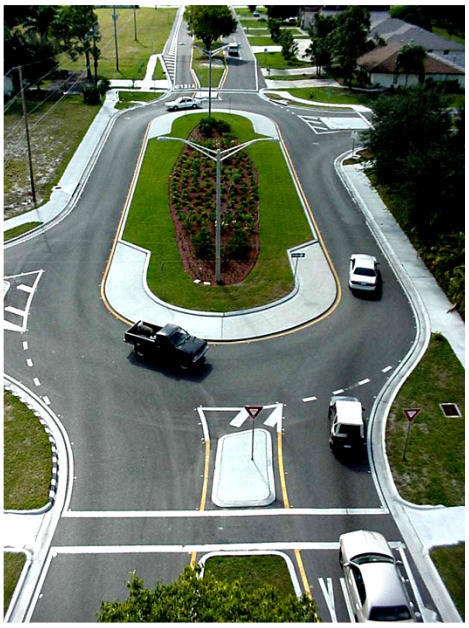
Freeway Interchanges

Phoenix, AZ

Morongo, CA

Kansas City, MO

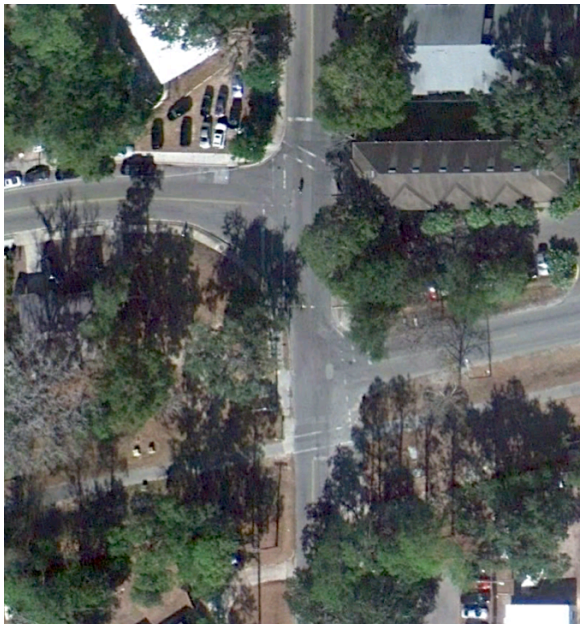
Topeka, AZ



Rectangular
Cape Coral

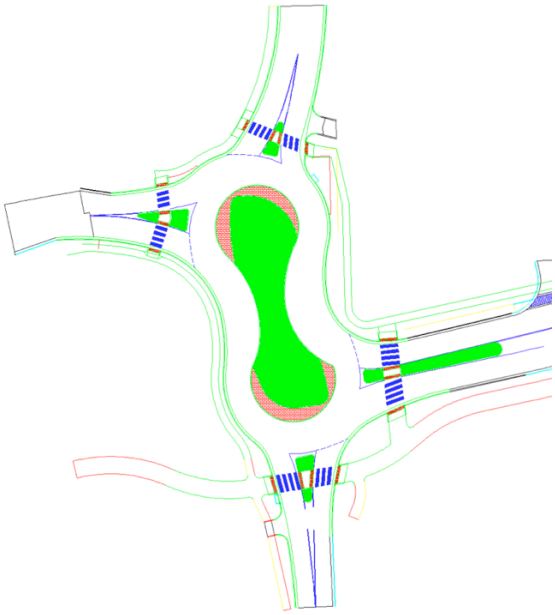
Closest - Twin Roundabouts

Peanut Roundabout



Depot Ave at SE 11th St.

Is a roundabout possible?



Yes, With Imagination

Sarasota - Three Lanes

Most Obvious Locations

- Two lane roads, especially near schools or high pedestrian areas
- Interchanges
- Entrances to and within subdivisions
- High crash locations
- In series to aid access management
- Rail crossings
- Approaches to towns to slow traffic and create gateways
- Rural intersections

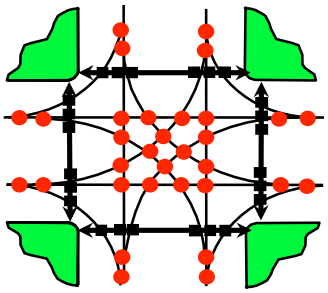
Safety

Insurance Institute for Highway Safety

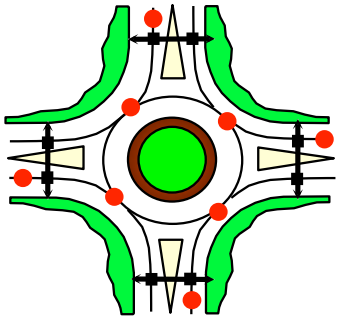
- 90% fewer fatal crashes,
- 75% fewer injury crashes
- 39 % overall crashes

- But crashes can also go up

Fewer Conflicts



- 32 Vehicle to vehicle conflicts
- 24 Vehicle to pedestrian conflicts



- 8 Vehicle to vehicle conflicts
- 8 Vehicle to pedestrian conflicts

Single Most Important Design Element
Speed Control

Daytona Beach East
Approach
Lots of deflection

North - no crashes

East - 3 minor crashes

Daytona Beach - West
Approach
No deflection

South - no crashes

West - 19 right angle crashes

But Crashes Can Go Up

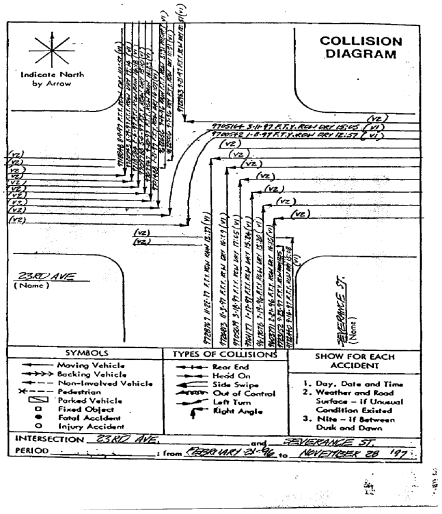
Table 1. Collisions before Roundabout Construction Started				
Year	1996	1997	1998	1999 (6 months)
PDO	4	4	1	1
Injury	3	1	1	2
Fatal	0	0	0	0
Total	7	5	2	3

Table 2. Collisions after Roundabout Opened				
Year	2000*	2001	2002	2003
PDO	8	4	2	8
Injury	4	2	5	5
Fatal	0	1	0	0
Total	12	7	7	13

Other Sites Crash Data

- 7.8 to 45.7 crashes a year
- 9.6 to 38.3 crashes a year.
- Police Chief – “All of the crashes are happening because drivers entering the roundabout too fast.”
- Common cause – lack of deflection – drivers entering too fast and not yielding

Before



After

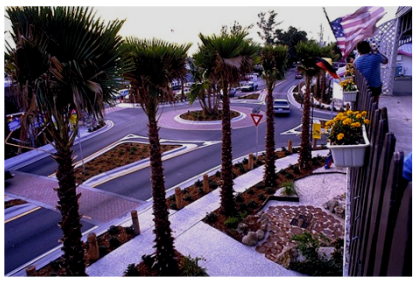
Hutchison, Kansas

19 crashes in one year before - one after

Bradenton Beach, FL – 17,000 vpd

Before

- 36 months
- 5 crashes
- 0 injury crashes



After

- 63 months
- 0 crashes
- 0 injury crashes

Hilton Head, SC

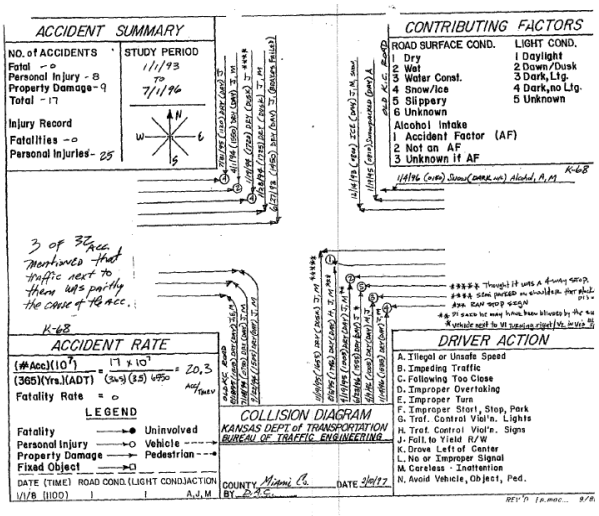
Before

- 36 months
- 48 crashes
- 15 injury crashes

After

- 46 months
- 9 crashes
- 0 injury crashes

Crash Data Rural Intersection



Rural Roundabouts - Same design criteria

K-68 & Old KC Road

(Before and After Crash Data)

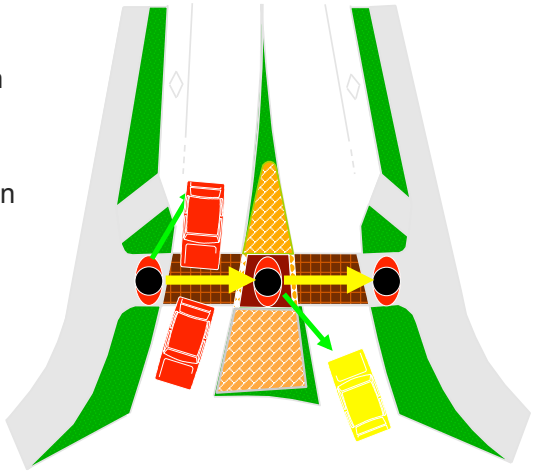
Years	Crashes	Injuries	Property Damage Only
1995-2000	33	42	17
2001-2006	9	0	9
% Change	-73%	-100%	-53%

Rural roundabouts may not have as many crashes per year but they are usually more severe

Pedestrian Safety

About 20-feet from yield line to pedestrian crossing

One physical vehicle length, measured when the vehicle is on an angle so that the crosswalk is open for pedestrians to use when a vehicle is stopped.



Pedestrian Safety

- Melbourne, Australia Study*
- Pedestrian crashes at all signalized intersections (about 2,500) Metro area for 2002 – 2006
  - Fatal: 27
  - Serious injury (hospital): 614
  - Other)Medical): 701
- Pedestrians at roundabouts (over 4,000) in Metro area for 1996 to 2000
  - Fatal: 0
  - Serious injury (hospital): 18
  - Other)Medical): 39

Pedestrian Safety

Roundabouts generally have few pedestrian crashes provided:

- Vehicle speeds are low – the lower the speed the higher the yield rate
- Adequate size splitter islands
- Move crossings back from yield line
- Define crossing areas
- Discourage crossings to central island – fence, tactile strip or planter strip – A.D.A Requirement

33

Highest Vehicle/Pedestrian Volume
Up to 58,500 Vehicles and
2,000 to 8,000 Pedestrians a Day
No pedestrian crashes in 13 years

Multi-lane Roundabouts and Pedestrians

- A.D.A. considers low-speed, one-lane roundabouts accessible
- Pedestrian assistance needed for two lane roundabouts – type of assistance being researched

Bicyclists

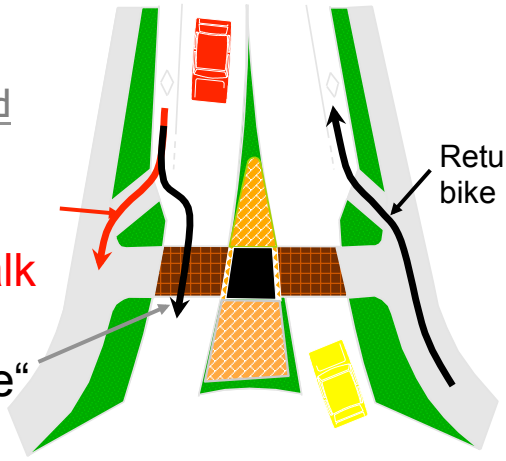
Bicyclists Are Given a Choice

Do not extend bike lane to yield line

Use the sidewalk

or

"Claim the Lane"



Grand Junction, CO

Jensen Beach, FL
Major Train Crossing

Geometric Design

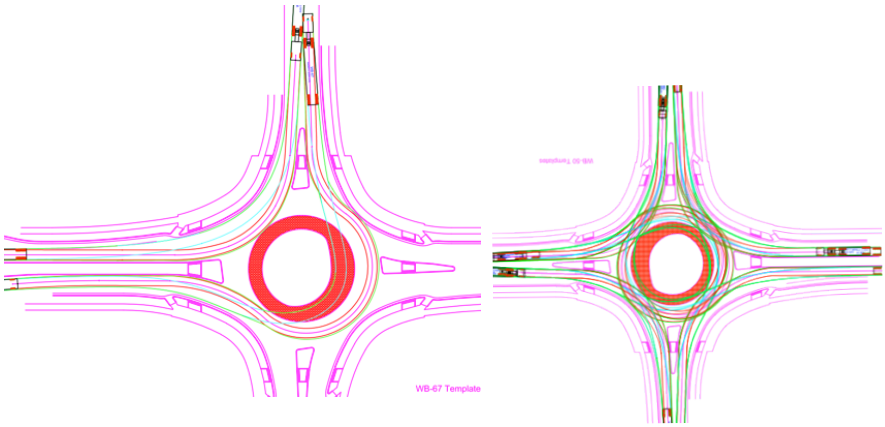
- Design philosophies
  - Radial
  - Offset Left
- Speed control
- Truck templates
- Pedestrian crosswalk locations
- Bike ramps
- Landscaping and Lighting
- Pavement markings
- Peer reviews

Speed Control

- Single most important design criteria
- FHWA Design speed recommendation - less than 25 all movements, I use 23 mph
- Entry and exit speeds the same or exit slightly faster - I to 2 mph
- Must also limit right turn speeds

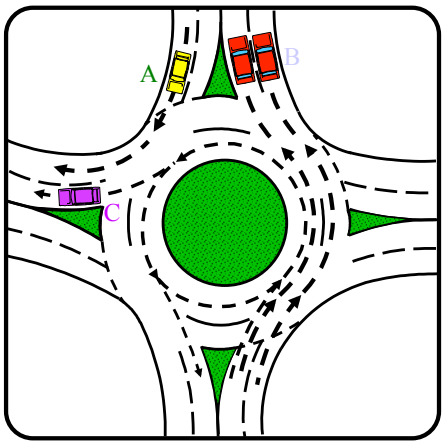
Different Design Speeds at Two, Two-lane Roundabouts

Truck Templates



A 143 foot truck roundabout - Canada

Driving Roundabouts



Vehicle A - Right Turn

Vehicle B - Through, either lane

Vehicle C - Left, U-turn or complete circle

No other movements are legally possible

Roundabout Capacity

Roundabout Capacity

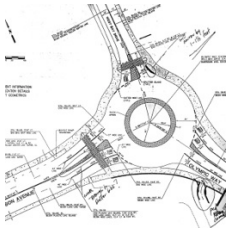
- Up to 30 percent higher capacity than signals even with fewer lanes – eliminate left turn lanes
- Reasons
  - No lost time
  - Drivers can use all available gaps
  - Low speed + small gaps = higher capacity

Signals Compared to Roundabouts

- Vehicle queues are typically twice as long
- Delays may be double
- Crashes about four times greater
- Crash severity is greater
- More expensive to maintain and can be more expensive to construct with roadwork
- Ugly
- However, in many cases they are the only option

Cautions

Common Problems



Almost straight through

Trucks run over curb

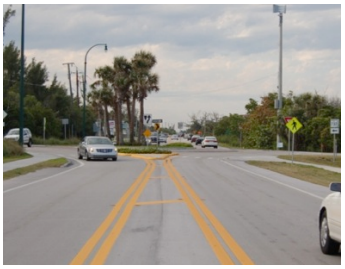
Almost straight through

Pedestrian crossing too close

Lack of deflection – Tee intersections

Trucks running over curb and gutter

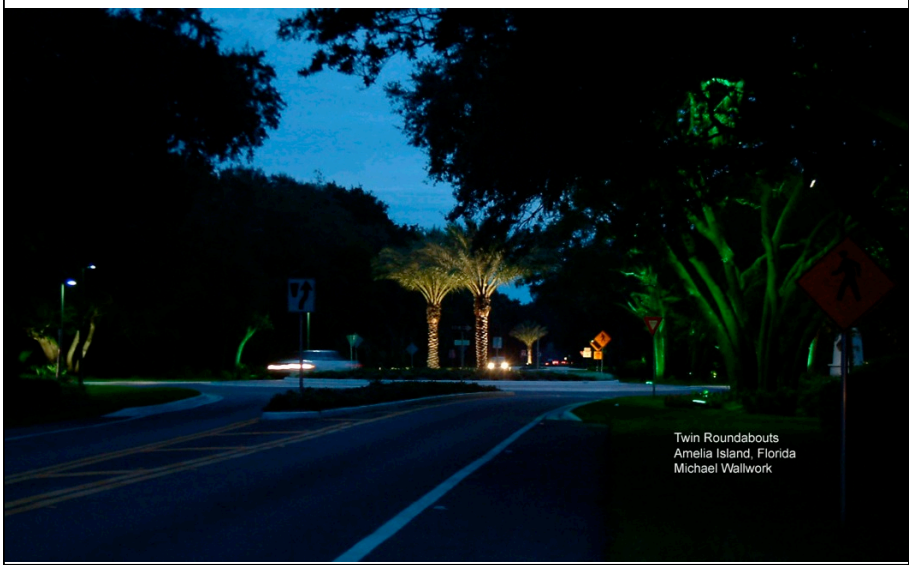
Lack of deflection



See through

Vehicles running over paint

Lighting - Amelia Island at night



Summary

- Roundabouts are the safest form of traffic control - if designed, lit and landscaped well
- Versatile
- Capacity typically higher than signals with fewer lanes
- Almost no maintenance cost and can last 100 year or more
- Pedestrians have priority over vehicles
- Can be beautiful

One-Way Streets

Introduced to increase capacity before two technological innovations

Introduced to:

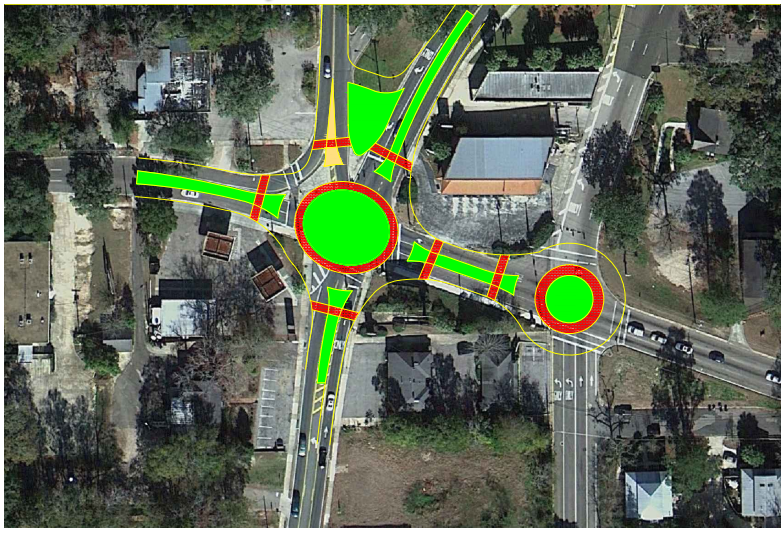
- Speed traffic through downtowns
- Increase road capacity

- Downside
  - Increased intersection congestion - increased turns
  - Higher speeds
  - Longer travel distances to destinations
  - Easier/harder for pedestrians to cross

Innovations

- Three and five lane treatments
- Roundabouts

Tallahassee – Possibilities Meridian, Gadsden and 7th



Another Possibility

Eliminate one-way pair of 65th and 7th Streets

Three Lane Treatment