



Exploring the Benefits of Modern Roundabouts

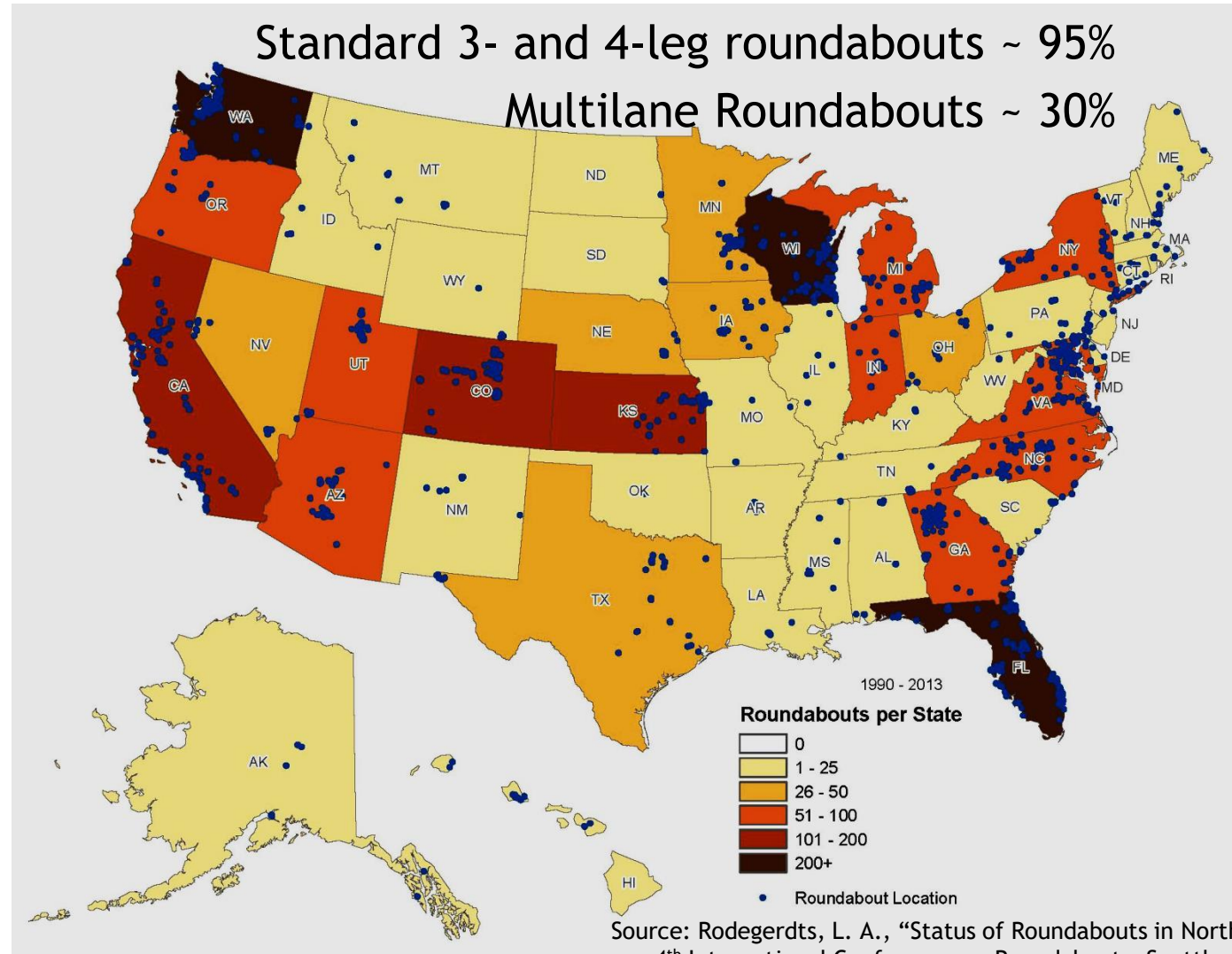
Wednesday, December 4, 2019

City of Franklin, TN

Why have roundabouts become an attractive choice for intersections?

- Increased Safety - reduced injury crash frequency
- Operational Efficiency - higher intersection capacities in most cases
- Difficult Geometry – more than 5 legs
- Wide Nodes/Narrow Roads
- Safer for Pedestrians
- Reduced Costs (Lifecycle) – collision reduction savings (societal) are substantial
- Quality of Life – improved retail access, community gateways, aesthetics, harmonized transportation and land use (“complete streets”)

U.S. sites by state c. 2013



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

Historical Concerns



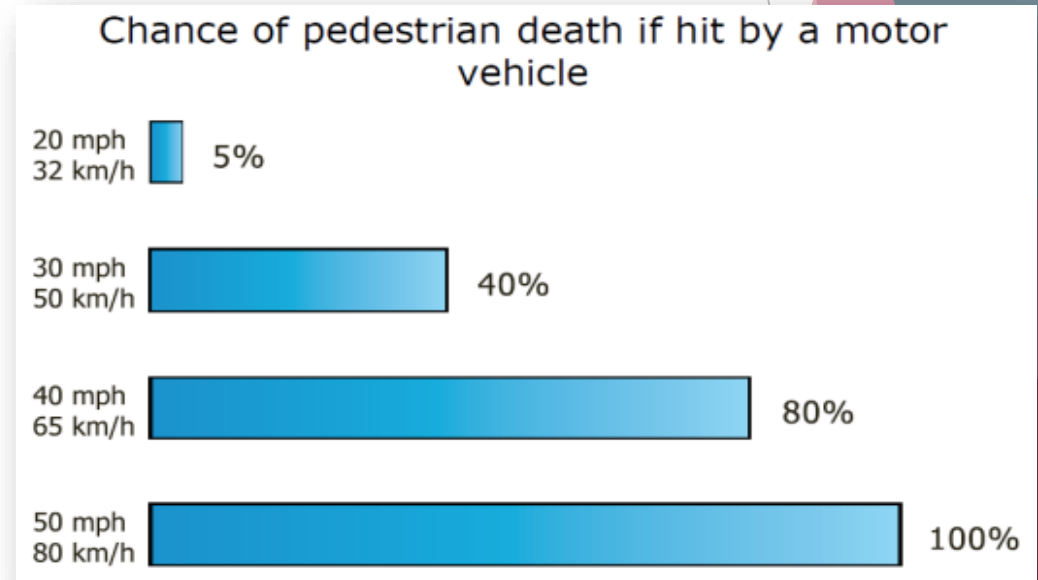
Source: NCHRP Synthesis 264

Benefits

- Can improve safety
 - Vehicle
 - Pedestrian/Bicyclists
- Can improve operations
 - Higher capacity, less delay
- Can reduce footprint

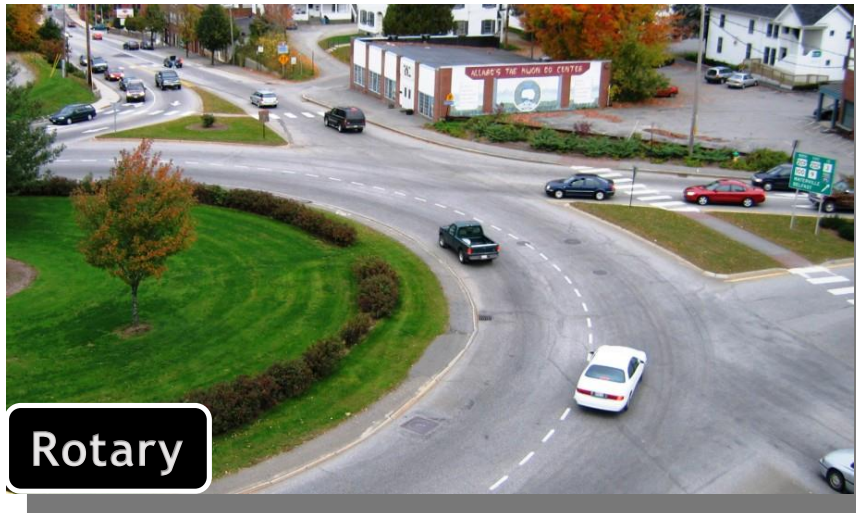
Traffic Control Prior to RBT	% Reduction in Injury Crashes
Signalized	78
All-Way Stop	46
Two-Way Stop	82

NCHRP 672, Exhibit 5-15



NCHRP 572, Table 28

What a Modern Roundabout is not...

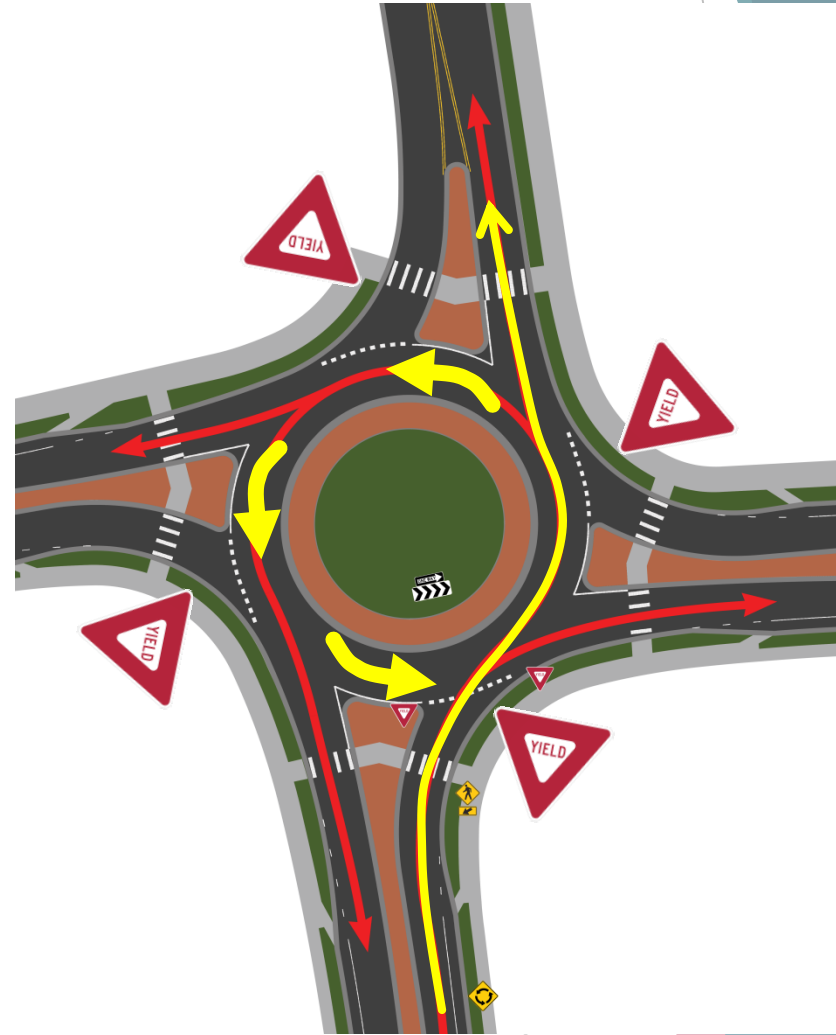


Nonconforming Traffic Circle



What is a modern roundabout?

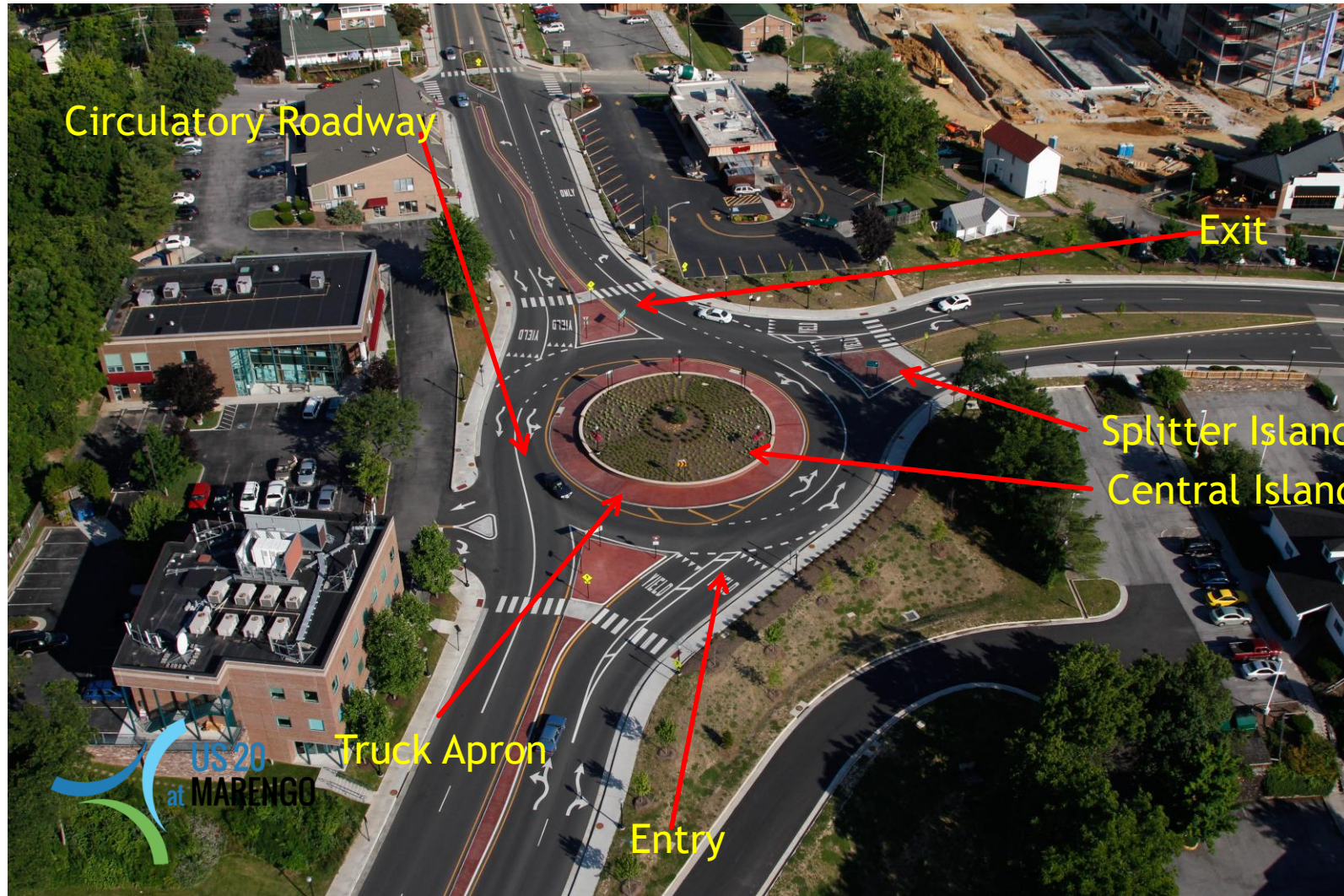
- ▶ A compact circular intersection in which traffic flows counter-clockwise around a center island
- ▶ Entering traffic yields
- ▶ Approaches are channelized to deflect traffic into a proper entry path
- ▶ Designed to slow the speed of vehicles



Traffic Flow (comparable to Mallory/Liberty Pike)



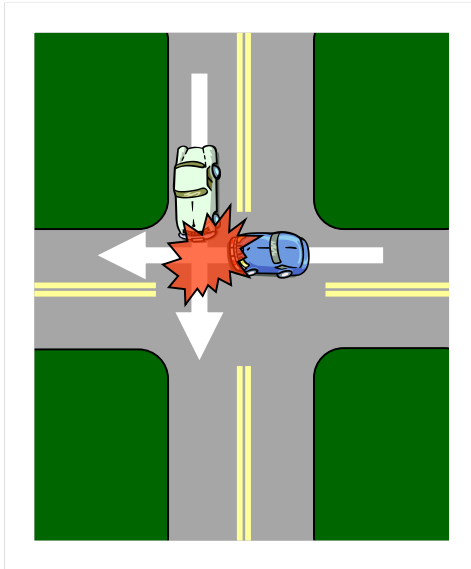
Physical Features



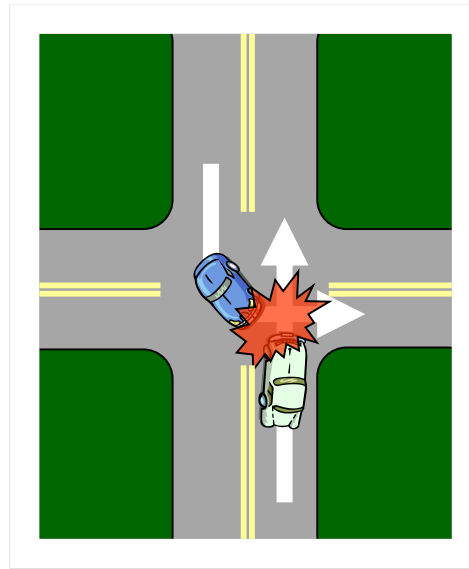
Type of Crashes

Typical 4-leg intersection

Angle

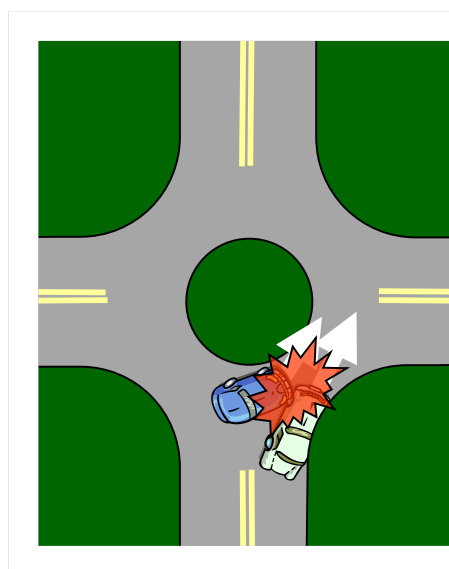


Left turn



Roundabout

Sideswipe



Avoidable Collisions ▶ Severe Angle and turning movement collisions are avoidable



At a Traffic Signal...	At a Roundabout...
High speeds	Low speeds
Short response time	Situation changes slowly/More Perception Reaction Time
High energy crashes	Low energy crashes
Unforgiving environment	Forgiving environment
High severity crashes	Low severity crashes
Complexity	Gap-seeking can be complex
Wide visual scans required	Narrow visual scans required
Traffic from multiple directions	Traffic from one direction

Uncontested Safety History with injury reduction stats.

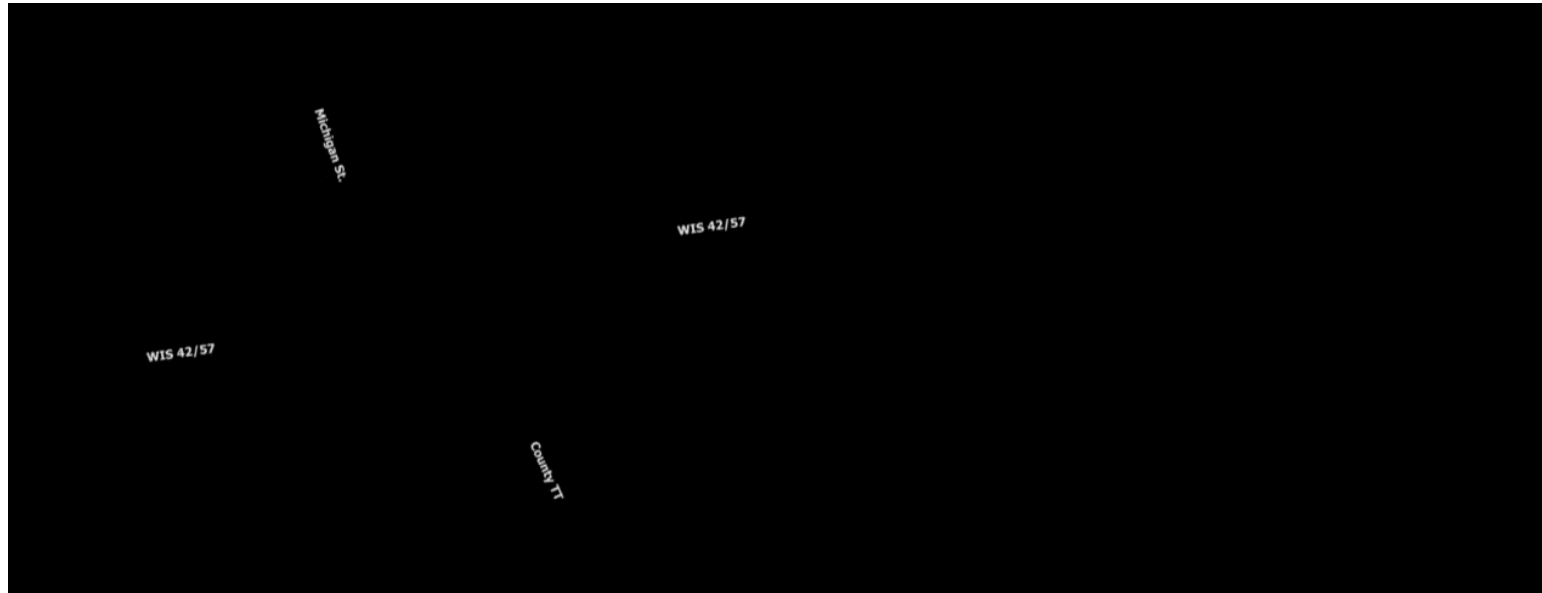
(FHWA/NCHRP
Report 888)

Table 2-6. CMFs for conversion of stop-control and signalized intersections to a roundabout.

Treatment	Setting	Crash Type		Source
		All	Injury	
TWSC to single-lane roundabout	Rural	0.29	0.13	HSM 2010
	Suburban	0.22	0.22	HSM 2010
	Urban	0.61	0.22	HSM 2010
TWSC to two-lane roundabout	Suburban	0.81	0.32	HSM 2010
	Urban	0.88	–	HSM 2010
TWSC to single-lane or two-lane roundabout	Suburban	0.68	0.29	HSM 2010
	Urban	0.71	0.19	HSM 2010
	All	0.56	0.18	HSM 2010
AWSC to single-lane or two-lane roundabout	All	1.03	–	HSM 2010
Signal to single-lane roundabout	All	0.74	0.45	Gross et al. 2010
Signal to two-lane roundabout	Suburban	0.33	–	HSM 2010
	All	0.81	0.29	Gross et al. 2010
Signal to single-lane or two-lane roundabout	Suburban	0.58	0.26	Gross et al. 2010
	Urban	0.99	0.40	HSM 2010
	Urban	1.15	0.45	Gross et al. 2010
	3-approach	1.07	0.37	Gross et al. 2010
	4-approach	0.76	0.34	Gross et al. 2010
	All	0.52	0.22	HSM 2010
	All	0.79	0.34	Gross et al. 2010

NOTES: TWSC = two-way stop-controlled; AWSC = all-way stop-controlled.

Compare Traffic Operations



Roundabouts and Driveway Access



Place-making using roundabouts...

Before



After



Trucks in Roundabouts



Roundabouts next to schools



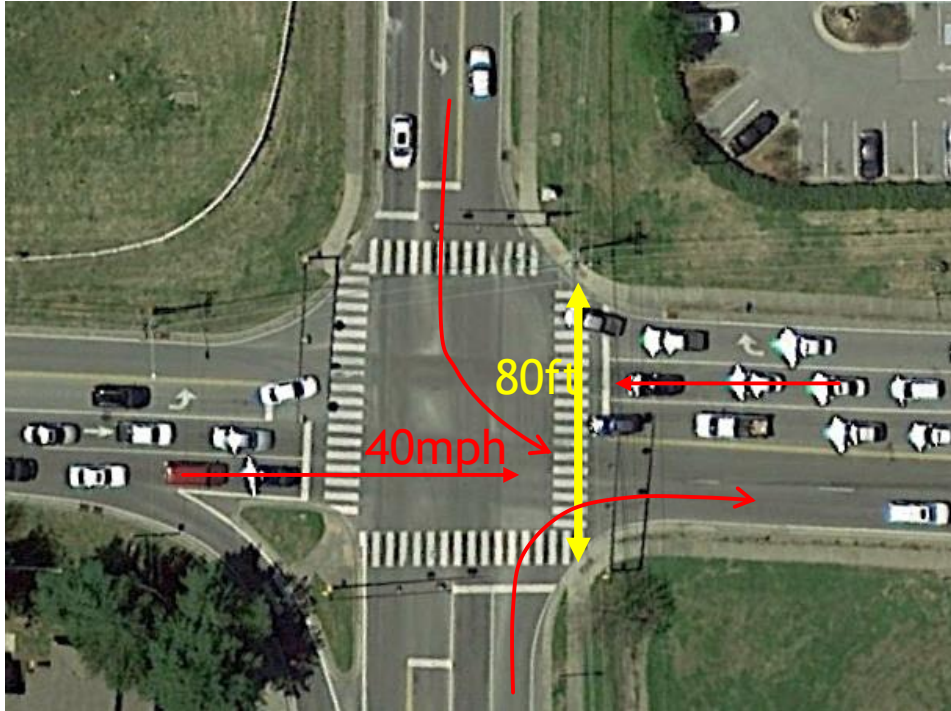
Work with young drivers



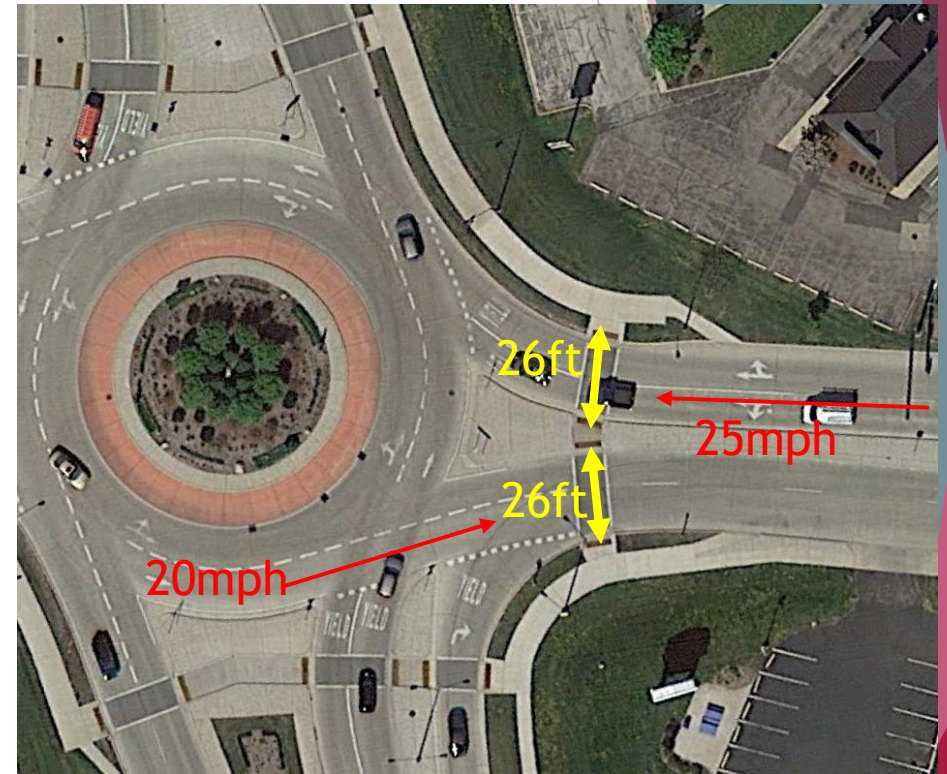
Roundabouts and Pedestrian Safety

- ▶ Roundabouts that replace stop signs and traffic signals have reduced the number of and severity of pedestrian crashes throughout the world.
- ▶ Pedestrian injuries have been reduced by as much as 89 percent.
- ▶ Roundabouts are safer for pedestrians than other intersection control types because:
 - ▶ They minimize vehicle speeds
 - ▶ There are fewer opportunities for crashes to occur
 - ▶ They maximize driver and pedestrian awareness
 - ▶ They minimize pedestrian exposure to traffic

Compare Crossing Risks



- Longer crossing
- Traffic from 3 directions
- High speed crossing



- Short crossing
- Traffic from 1 direction
- Low speed crossing

Crossing a Roundabout



School Crossings



Roundabouts Maximize Driver and Pedestrian Awareness

- ▶ Pedestrian crashes that happen when motorists run red signals, miss stop signs, and make right-turn-on-red movements do not happen at roundabouts
- ▶ The yield rule also encourages pedestrians to make sure motorists see them before crossing, eliminating the sense of security present at stop signs and signals
- ▶ There is no guaranteed stop condition at any intersection, so pedestrians and motorists need to pay attention to each other

Alternative Crosswalk Traffic Control

- Rectangular Rapid Flashing Beacon (RRFB)



Ground-mounted regulatory signs – on the medians



Local Education is Needed

How to Drive Through a Roundabout

CHOOSE YOUR LANE BEFORE ENTERING A ROUNDABOUT

As with any other intersection, the proper lane must be chosen before entering a roundabout.

In advance of the roundabout, signs and pavement markings will always indicate which lanes may be used for the direction you want to go.

Keep left to turn left through the roundabout and keep right to turn right.

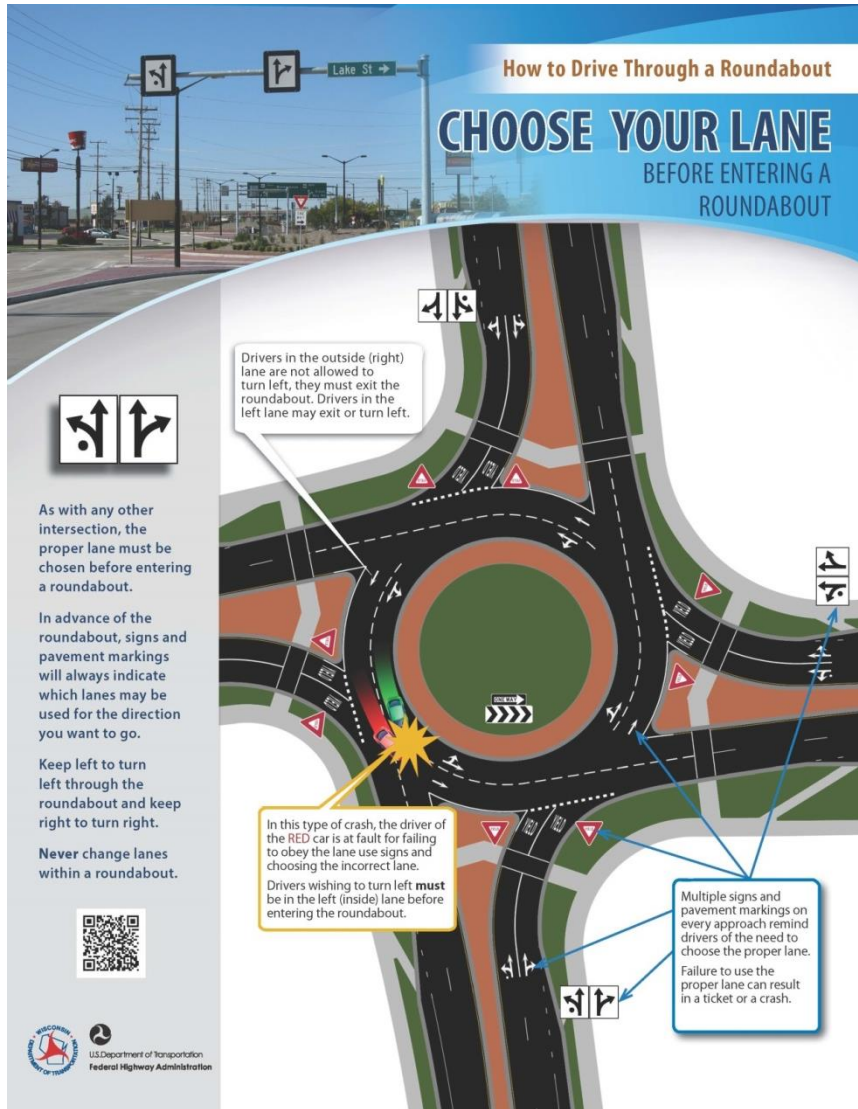
Never change lanes within a roundabout.

Drivers in the outside (right) lane are not allowed to turn left; they must exit the roundabout. Drivers in the left lane may exit or turn left.

In this type of crash, the driver of the RED car is at fault for failing to obey the lane use signs and choosing the incorrect lane.

Drivers wishing to turn left **must** be in the left (inside) lane before entering the roundabout.

Multiple signs and pavement markings on every approach remind drivers of the need to choose the proper lane. Failure to use the proper lane can result in a ticket or a crash.



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Driving a Roundabout Turn by Turn

► Observe all standard road rules, including yielding for pedestrians in crosswalks.

► To safely and efficiently drive a roundabout:

- Slow down.
- Read advance signing and choose correct lane.
- Yield to traffic in all lanes on your left before entering.
- Stay in your lane to your exit.

Sample Turning Movements

Right Turn / Continue Straight
Continue Straight / Left Turn / U-turn

Always obey the signs and markings

As you get closer to the roundabout entrance, it is very important to observe the signs and arrows to determine which lane to use before entering a roundabout. Signs above the road and white arrows on the road will show the correct lane to use.

Roundabout ahead, slow down.

Guide signs near the entry to a roundabout show lane designations.

Yield to all traffic in the roundabout.

Roundabout traffic travels one-way.

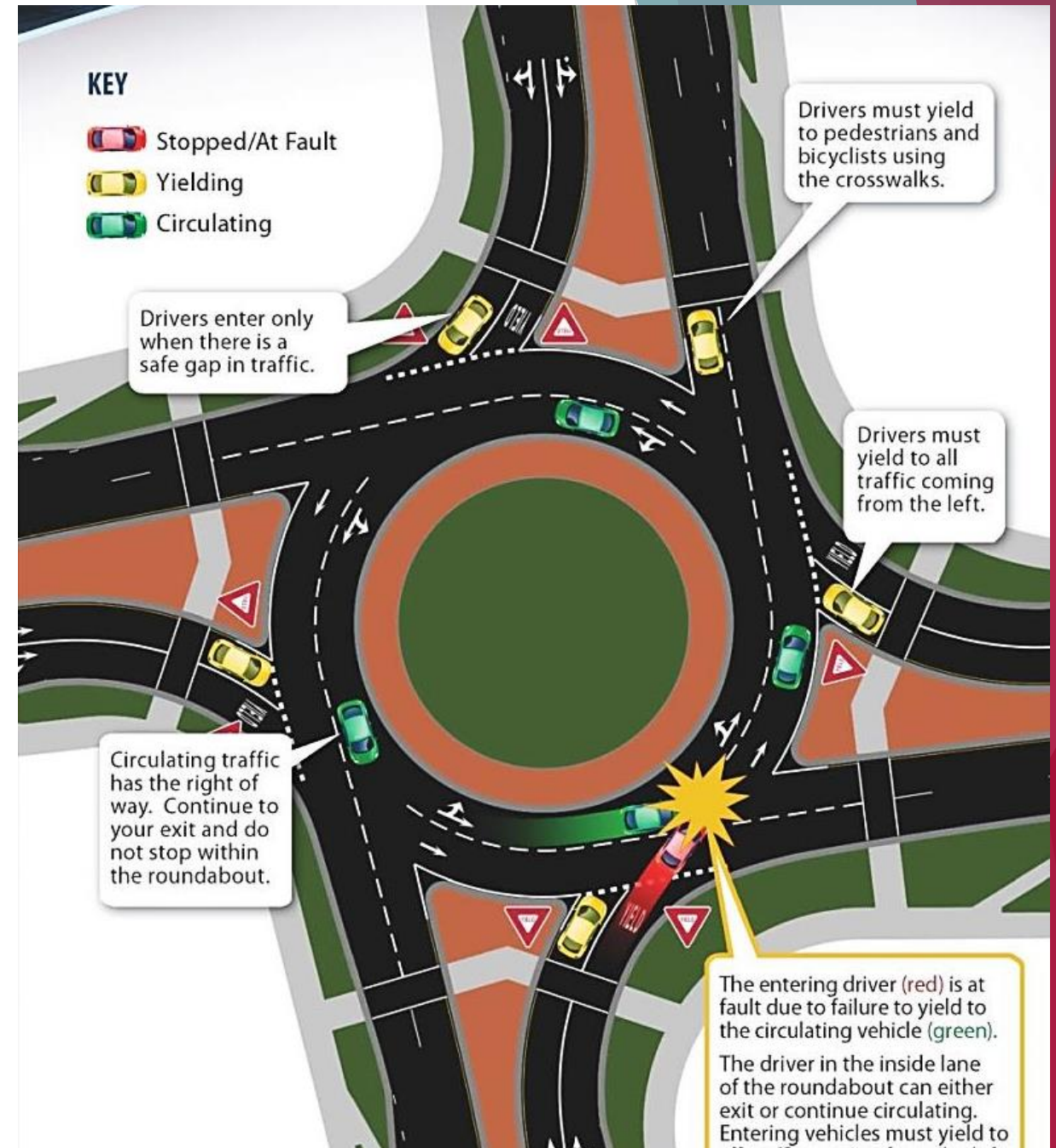
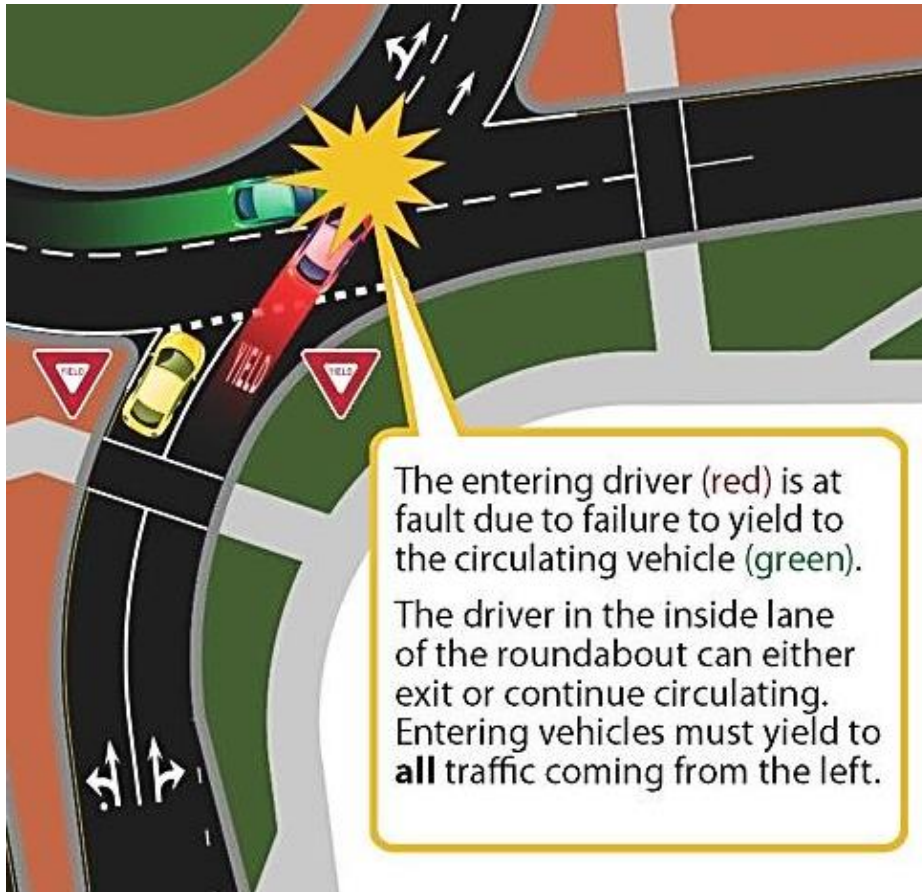
May 2013



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The 3-E's of Traffic Management:

- Engineering
- Education
- Enforcement



Questions?