City of Ann Arbor Transportation Commission

October 21, 2020

By:

Cynthia Redinger, PE, PTOE, RSP$_1$

Transportation Engineer

Roundabouts: A discussion of Use and Safety

Source: FHWA Safe Roads for a Safer Future

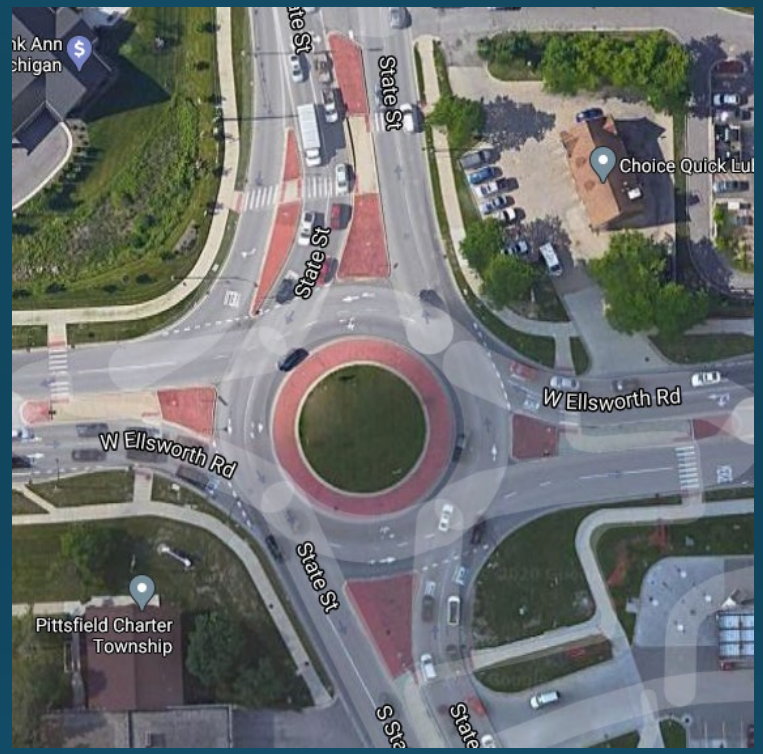
What is a modern roundabout?

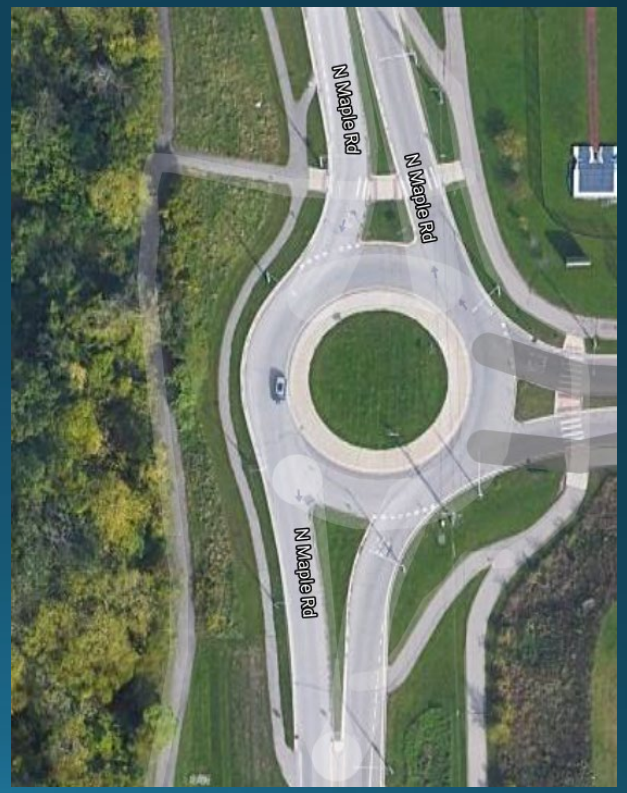
- A circular intersection in which traffic flows counter-clockwise around a center island
- Entering traffic yields
- Approaches are channelized to deflect traffic into a proper entry path
- Designed to slow the speed of vehicles

Roundabout Types

Determined by Circulating Roadway:

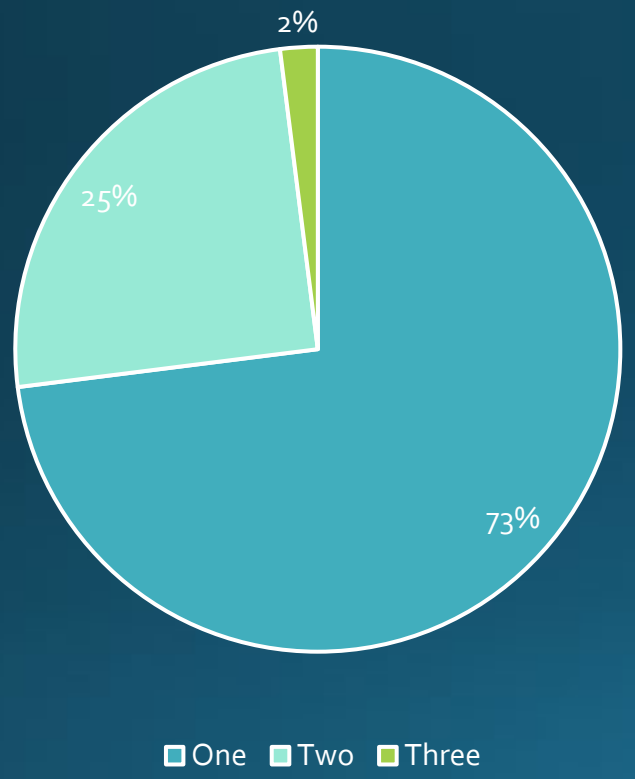
- Multi Lane
- Single Lane



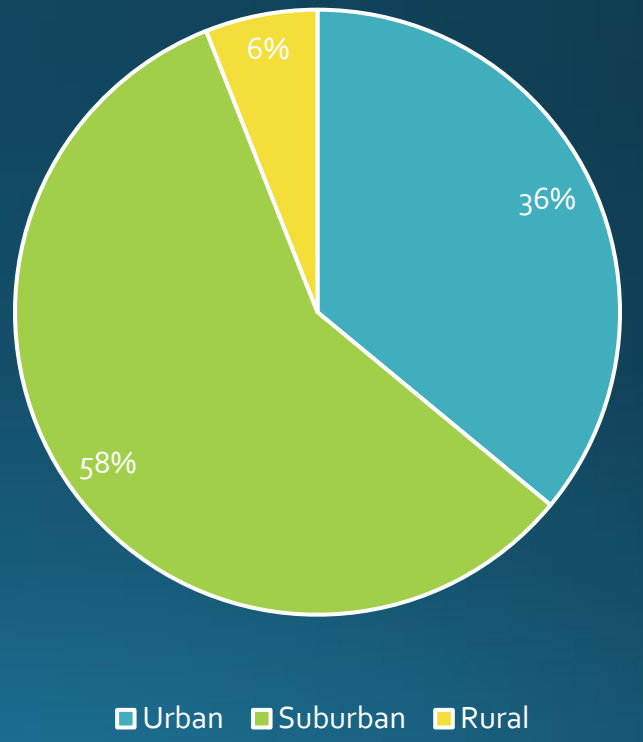


Roundabouts in the USA

of Circulating Lanes



Location Setting



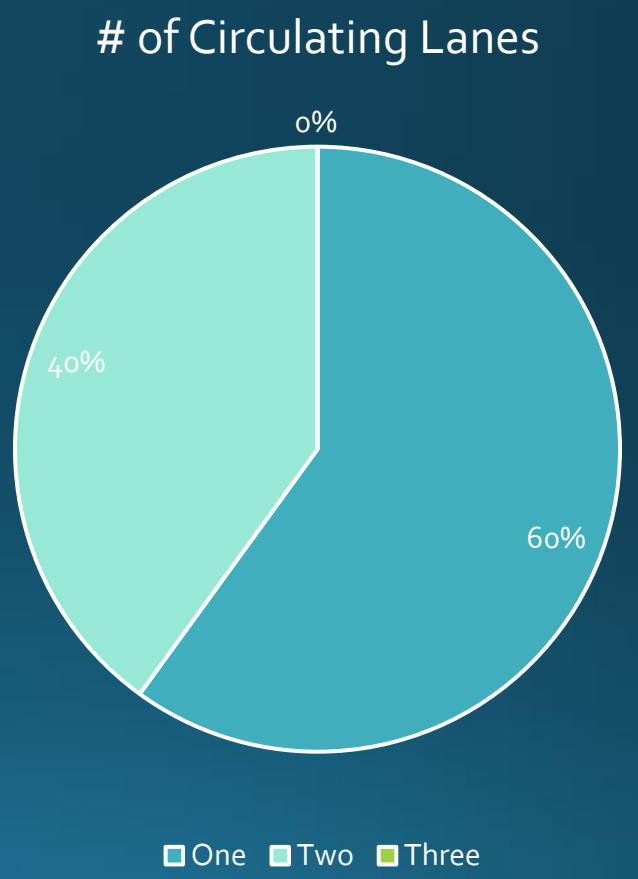
Source: NCHRP Report 572: Roundabouts in the United States

Roundabouts in Ann Arbor

City of Ann Arbor
- Geddes-Earhart
- Pittsfield-Jeanne
- Nixon-Huron Parkway
- Nixon-Dhu Varren-Green

MDOT
- Geddes-US 23 NB
- Geddes-US 23 SB
- Maple-M 14 EB
- Maple- M14 WB

Washtenaw County Road Commission
- Ellsworth-State
- Maple-Skyline High School

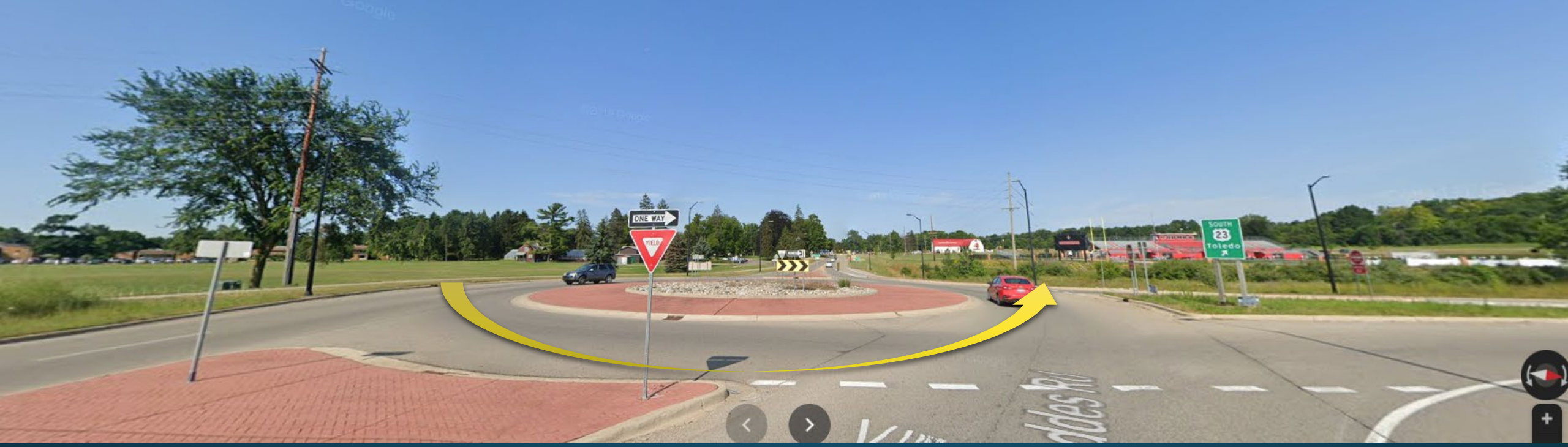


Key Features

- Yield control
- Circulatory roadway
- Central island
- Splitter island
- Pedestrian access
- Bicycle access
- Landscaping
- Truck apron
- Signing and pavement markings
- Street Lights

Yield Control

Vehicles yield upon entry to others in the circulating roadway.



Circulatory Roadway

No traffic control in the circulatory roadway.
Travel is counter-clockwise.

Central Island

Central island deflects vehicles from a straight-line path.

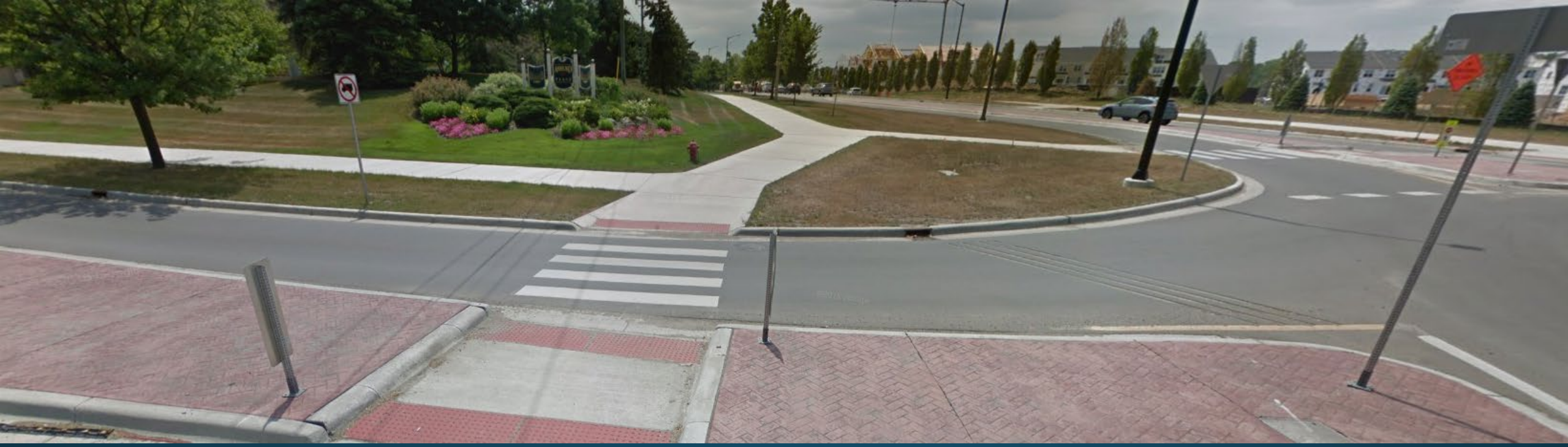
Splitter islands separate, deflect, and slow traffic.

Splitter islands also provide refuge for pedestrians crossing the approach.

Splitter Island

Landscaping

Landscaping provides a visual screen for drivers. It makes them aware of the intersection and directs their attention to look left.



Pedestrian Access

Pedestrian access meets ADA requirements. Crosswalks are designed in accordance with guidelines.

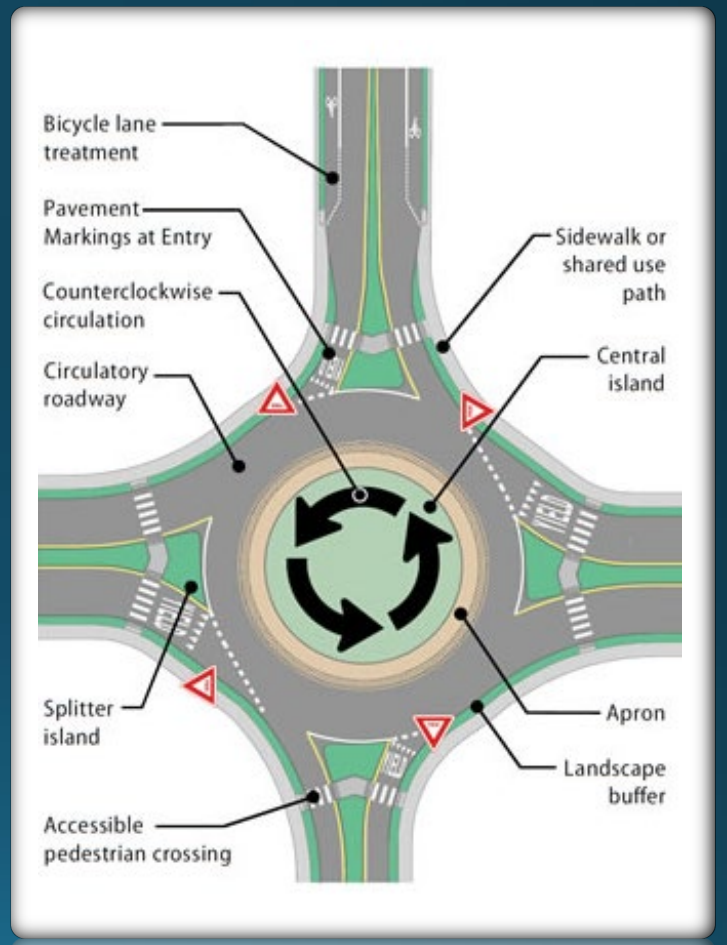
Bicycle Access

Bicycle access provided for a variety of rider types. Low stress access provided through shared-use routes. Bicyclist may also use the circulating roadway.

Truck Apron

Truck aprons allow for tighter vehicle operating areas while accommodating truck movements.

Signing & Pavement Markings



Source: FHWA Office of Safety

Street Lights

Positive contrast lighting for pedestrian crossings. Vehicle conflict point illumination.

Why Choose a Roundabout?

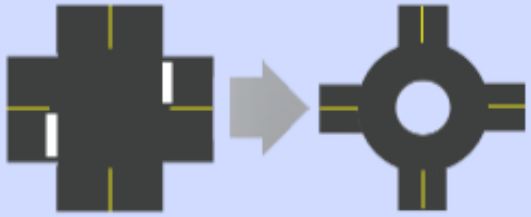
- Improve safety
- Slow drivers
- Reduce congestion and pollution
- Save money
- Complement community values

Proven Safety Countermeasure

- Roundabouts are one of the FHWA Office of Safety's 20 Proven Safety Countermeasures.
- Highest crash reductions occur in severe injury crashes.
- Targeted crash types include angle and left turn

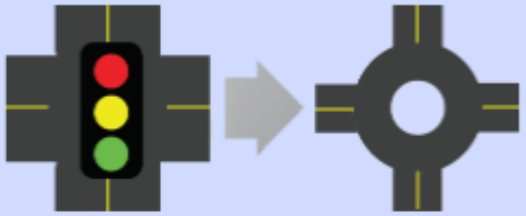
Roundabouts

Two-Way Stop-Controlled Intersection to a Roundabout



82%
Reduction in severe crashes

Signalized Intersection to a Roundabout



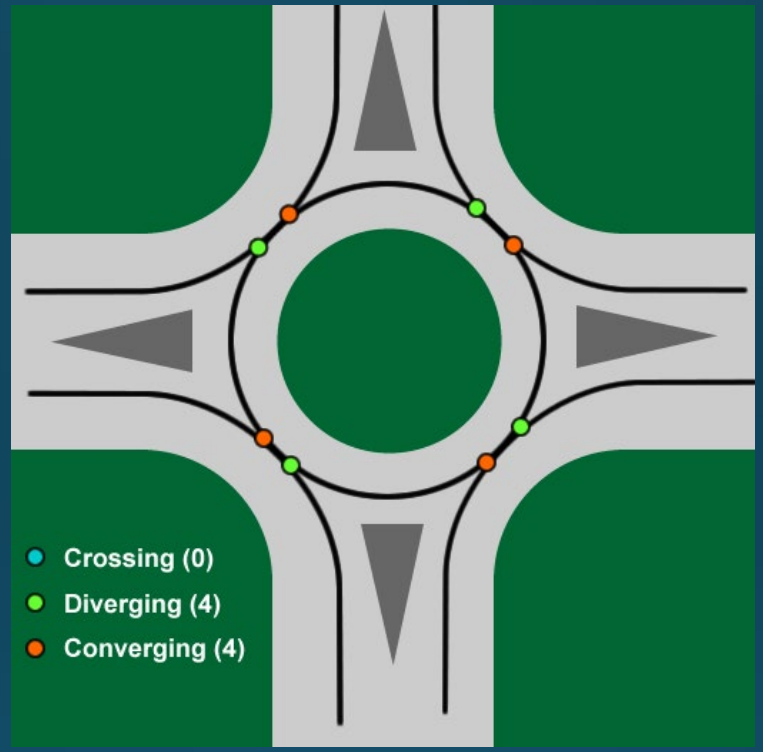
78%
Reduction in severe crashes

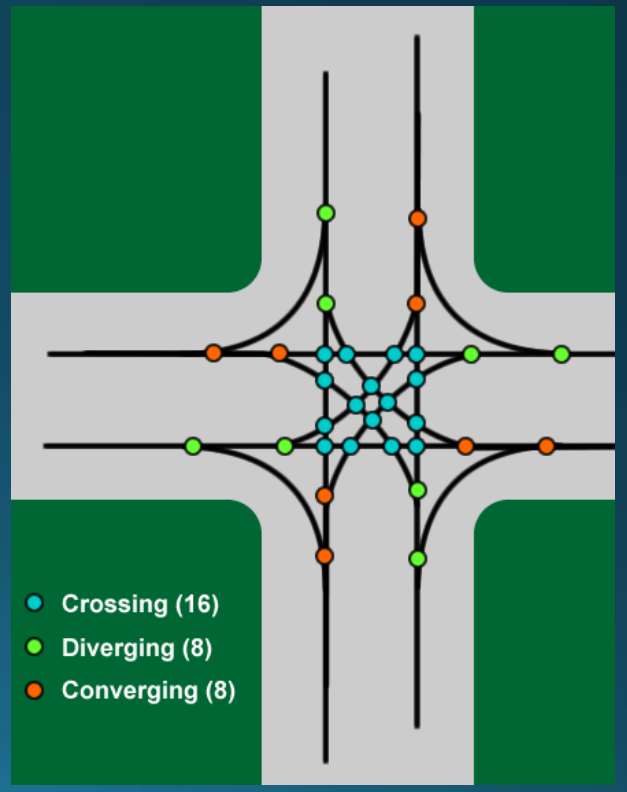
Source: *Highway Safety Manual*

Vehicle-Vehicle Conflict Points

- Vehicle-vehicle conflict points are places where two vehicles could possibly collide.

- Roundabouts reduce the number of conflict points from 32 to 8.

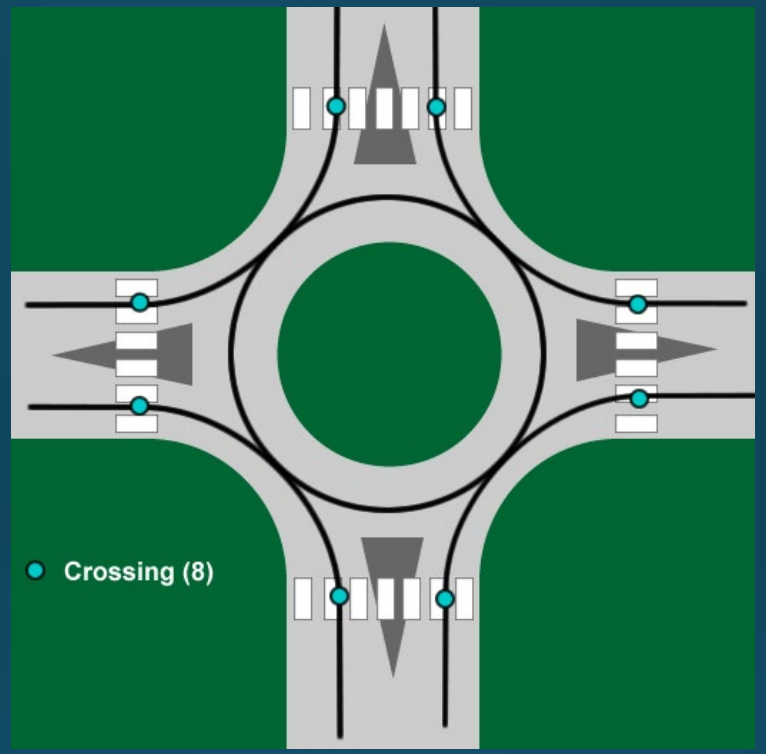


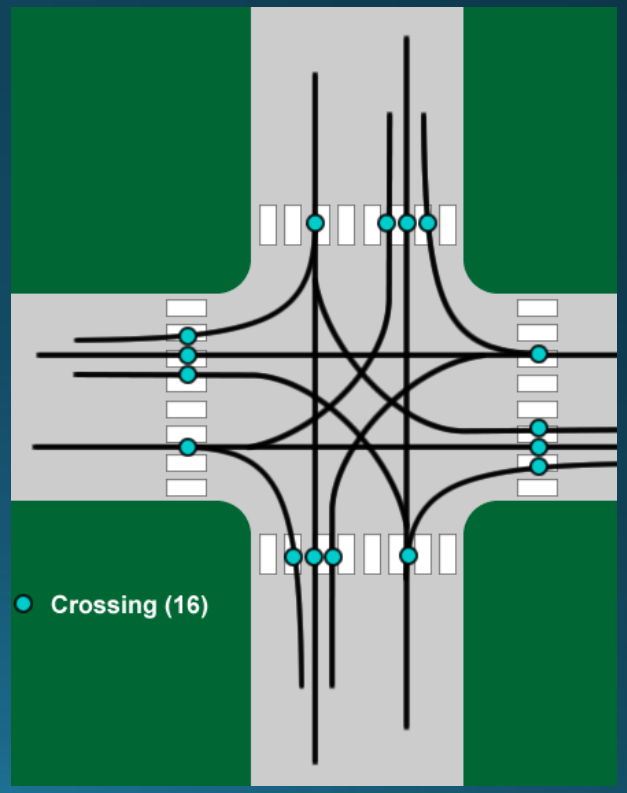


Vehicle-Pedestrian Conflict Points

- Vehicle-pedestrian conflict points are places where a vehicle and a pedestrian could possibly collide.

- Pedestrians face half the conflict points and only cross one direction of travel at a time.





Pedestrian Safety Considerations

- Pedestrians are generally safer in roundabout intersections although a more active interaction is necessary.
- Pedestrians have the advantage of crossing one direction of traffic at a time.
- Roundabout design focuses on reduced driver speeds.

Pedestrian ADA Enhancements

- Truncated domes
- Accessible ramps
- Angled turns in sidewalk
- Audible warning strips

Older Driver Safety Considerations

- Narrowing of visual field
- Restricting of the area of visual attention
- Decreased motion sensitivity
- Decline in selective attention
- Decline in divided attention
- Decline in perception –reaction time
- Loss of flexibility

Conventional Intersection	Roundabout
High speeds	Low speeds
Little response time	Situation changes slowly/more response time
High energy crashes	Low energy crashes
Unforgiving environment	Forgiving environment
High severity crashes	Low severity crashes
Complexity	Easier to judge gaps
Wide visual scans	Narrow visual scans

Older Driver Safety Considerations

FHWA's List of Where to Consider Roundabouts

- Intersections with high crash rates/high severity rates
- Intersections with complex geometry, skewed approaches, >4 approaches
- Rural intersections with high-speed approaches
- Freeway interchange ramp terminals
- Closely spaced intersections
- Replacement of all-way stops
- Replacement of signalized intersections
- At intersections with high left turn volumes
- Replacement of 2-way stops with high side-street delay
- Intersections with high U-turn movements
- Transitions from higher-speed to lower-speed areas
- Where aesthetics are important
- Where accommodating older drivers is an objective

Source: FHWA Safe Roads for a Safer Future

Nixon/Dhu Varren/Green

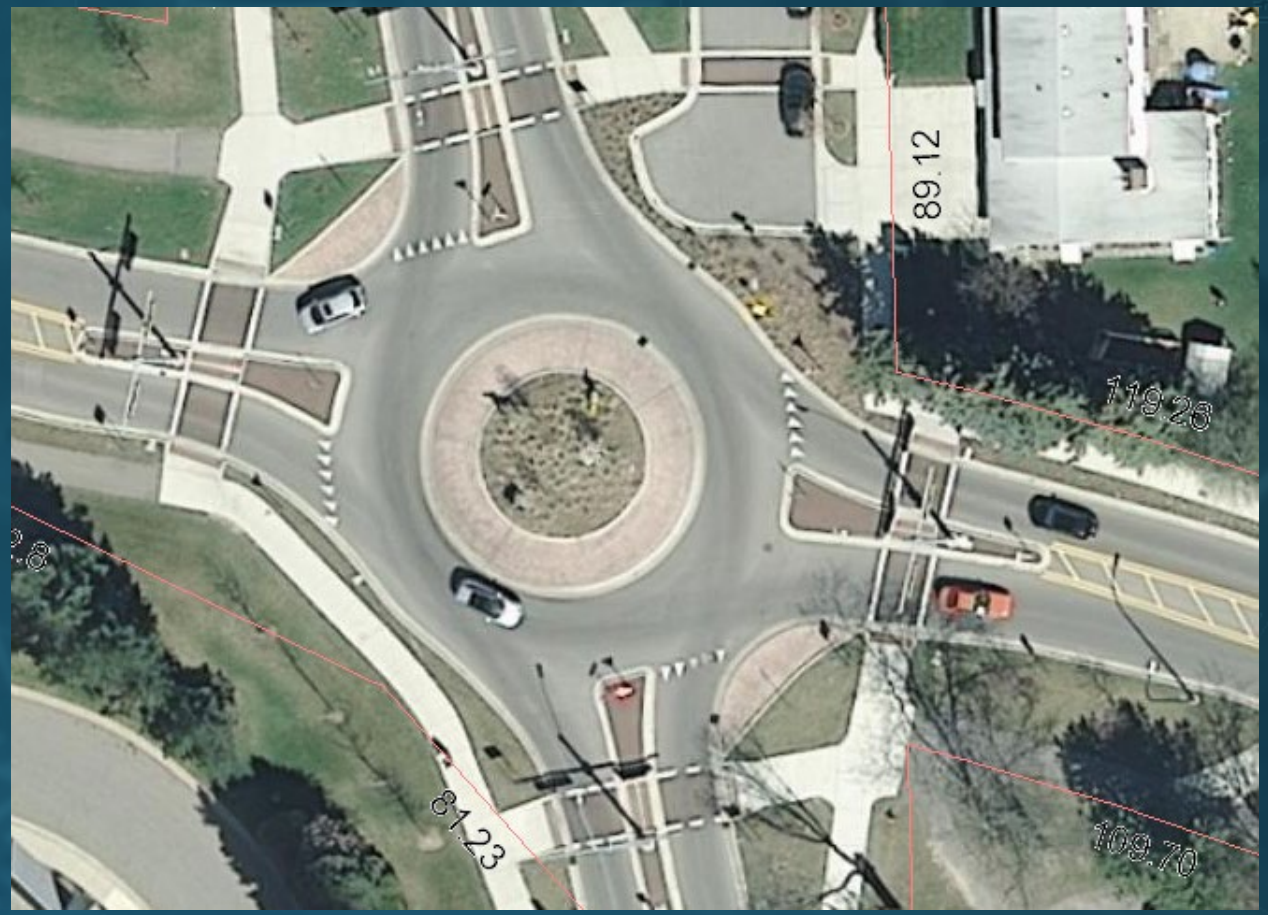
Before

Nixon/Dhu Varren/Green

After

Nixon/Huron Parkway

Before



Nixon/Huron Parkway

After

Geddes/Earhart

Before

Geddes/Earhart

After