1. What is a roundabout?

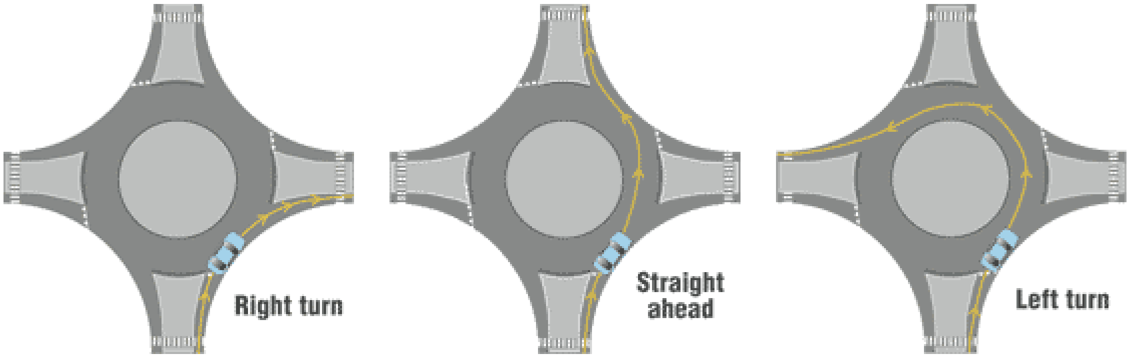
The modern roundabout is a circular intersection with design features that promote safe and efficient traffic flow. At roundabouts in the United States, vehicles travel counterclockwise around a raised center island, **with entering traffic yielding the right-of-way to circulating traffic**. Entering vehicles negotiate a curve sharp enough to slow speeds to about 15-20 mph. Within the roundabout and as vehicles exit, slow speeds are maintained by directing traffic around the center island and exit curves which are designed to control speeds. Slow speeds aid in the smooth movement of vehicles into, around, and out of a roundabout. Drivers approaching a roundabout must select the appropriate lane for their desired movement following guidance provided by traffic signs and pavement markings, reduce their speeds to about 20 mph, be prepared to yield to pedestrians and bicyclists, and look for potential conflicts with vehicles already in the circle. Once in the roundabout, drivers proceed to the appropriate exit.

Modern roundabout

Older traffic circle

2. How do roundabouts differ from older traffic circles and rotaries?

Modern roundabouts are much smaller than older traffic circles and rotaries, and roundabouts require vehicles to negotiate a sharper curve to enter. These differences make travel speeds in roundabouts much slower than speeds in traffic circles and rotaries. Because of the higher speeds in older circles and rotaries drivers waiting to enter could not find appropriate gaps in which to safely merge. As a result, many were equipped with traffic signals or stop signs to help reduce potential crashes. In addition, some older traffic circles and rotaries operated according to the traditional "yield-to-the-right" rule, with circulating traffic yielding to entering traffic. Today's roundabouts have moved to the **"yield at entry"** which allows the circulating traffic to operate without delay.



Common traffic maneuvers at roundabouts

3. How do roundabouts affect safety?

Several features of roundabouts promote safety. At traditional intersections with stop signs or traffic signals, some of the most common types of crashes are right-angle, left-turn, and head-on collisions. These types of collisions can be severe because vehicles may be traveling through the intersection at high speeds. With roundabouts, these types of potentially serious crashes essentially are eliminated because vehicles travel in the same direction. Installing roundabouts in place of traffic signals can also reduce the likelihood of rear-end crashes and their severity by removing the incentive for drivers to speed up as they approach green lights and by reducing abrupt stops at red lights. The vehicle-to-vehicle conflicts that occur at roundabouts generally involve a vehicle merging into the circular roadway, with both vehicles traveling at low speeds (15-20 mph).

A 2001 Insurance Institute for Highway Safety study of 23 intersections in the United States reported that converting intersections from traffic signals or stop signs to roundabouts reduced injury crashes by 80 percent and all crashes by 40 percent.[1] Similar results were reported by Eisenman et al.: a 75 percent decrease in injury crashes and a 37 percent decrease in total crashes at 35 intersections that were converted from traffic signals to roundabouts.[2] Studies of intersections in Europe and Australia that were converted to roundabouts have reported 41-61 percent reductions in injury crashes and 45-75 percent reductions in severe injury crashes.[3]

4. How do roundabouts affect traffic flow?

Several studies have been conducted that reported significant improvements in traffic flow following conversion of traditional intersections to roundabouts. A study of three intersections in Kansas, Maryland, and Nevada, where roundabouts replaced stop signs, found that vehicle delays were reduced 13-23 percent and the proportion of vehicles that stopped was reduced 14-37 percent.[4] A study of three locations in New Hampshire, New York, and Washington, where roundabouts replaced traffic signals or stop signs, found an 89 percent average reduction in vehicle delays and a 56 percent average reduction in vehicle stops.[5] A study of 11 intersections in Kansas found a 65 percent average reduction in delays and a 52 percent average reduction in vehicle stops after roundabouts were installed.[6]

A recent Insurance Institute for Highway Safety study documented missed opportunities to improve traffic flow and safety at 10 urban intersections suitable for roundabouts where either traffic signals were installed or major modifications were made to signalized intersections.[7] It was estimated that the use of one-lane roundabouts instead of traffic signals at these 10 intersections would have reduced vehicle delays by 62-74 percent. This is equivalent to approximately 325,000 fewer hours of vehicle delay on an annual basis.

5. Are there other benefits?

Because roundabouts improve the efficiency of traffic flow, they also reduce vehicle emissions and fuel consumption. In one study, replacing a signalized intersection with a roundabout reduced carbon monoxide emissions by 29 percent and nitrous oxide emissions by 21 percent.[8] In another study, replacing traffic signals and stop signs with roundabouts reduced carbon monoxide emissions by 32 percent, nitrous oxide emissions by 34 percent, carbon dioxide emissions by 37 percent, and hydrocarbon emissions by 42 percent.[9] Constructing roundabouts in place of traffic signals can reduce fuel consumption by about 30 percent.[8,10] At 10 intersections studied in Virginia, this amounted to more than 200,000 gallons of fuel per year.[7] And roundabouts can enhance aesthetics by providing landscaping opportunities.

6. Can roundabouts accommodate larger vehicles?

Yes. To accommodate vehicles with large turning radii such as trucks, buses, and tractor-trailers, roundabouts provide an area between the circulatory roadway and the central island, known as a truck apron, over which the rear wheels of these vehicles can safely track. The truck apron generally is composed of a different material texture than the paved surface, such as brick or cobble stones, to discourage routine use by smaller vehicles and pedestrians.

7. How do roundabouts affect older drivers?

Age-related declines in vision, hearing, and cognitive functions, as well as physical impairments, may affect some older adults' driving ability. Intersections can be especially challenging for older drivers. Relative to other age groups, senior drivers are over involved in crashes occurring at intersections. In 2004, about half of drivers 80 and older in fatal crashes were involved in multiple-vehicle intersection crashes, compared with 24 percent among drivers younger than 70. Older drivers' intersection crashes often are due to their failure to yield the right-of-way.[11] Particular problems for older drivers at traditional intersections include left turns and entering busy thoroughfares from cross streets. Roundabouts eliminate these situations entirely. A recent study in six communities where roundabouts replaced traditional intersections found that about two-thirds of drivers 65 and older supported the roundabouts.[12] Although safety effects of roundabouts specifically for older drivers are unknown, the 2001 Insurance Institute for Highway Safety study of 23 intersections converted from traffic signals or stop signs to roundabouts reported the average age of crash-involved drivers did not increase following the installation of roundabouts, suggesting roundabouts do not pose a problem for older drivers.[1]

8. Are roundabouts safe for pedestrians?

Roundabouts generally are safer for pedestrians than traditional intersections. In a roundabout, pedestrians walk on sidewalks around the perimeter of the circulatory roadway. If it is necessary for pedestrians to cross the roadway, they cross only one direction of traffic at a time. In addition, crossing distances are relatively short, and traffic speeds are lower than at traditional intersections. Studies in Europe indicate that, on average, converting conventional intersections to roundabouts can reduce pedestrian crashes by about 75 percent.[13,14] Single-lane roundabouts, in particular, have been reported to involve substantially lower pedestrian crash rates than comparable intersections with traffic signals.[15]

9. Do roundabouts require more space than traditional intersections?

Because they can process traffic more efficiently than traffic signals and stop signs, roundabouts typically require fewer traffic lanes to accommodate the same amount of traffic. Geometric design details vary from site to site and must take into account traffic volumes, land use, topography, and other factors. However, roundabouts do not necessarily require more space than traditional intersections. The following example from Asheville, North Carolina, illustrates that roundabout dimensions can be compatible with those of traditional intersections.

Before

After

Signalized intersection converted to a Roundabout in Asheville, North Carolina

10. Do drivers favor roundabouts?

Drivers may be skeptical, or even opposed, to roundabouts when they are proposed. However, opinions typically change when drivers become familiar with roundabouts. A 2002 Insurance Institute for Highway Safety study in three communities where roundabouts replaced stop sign-controlled intersections found 31 percent of drivers supported the roundabouts before construction compared with 63 percent shortly after.[4] A more recent study surveyed drivers in three additional communities where roundabouts replaced stop signs or traffic signals.[5] Overall, 36 percent of drivers supported the roundabouts before construction compared with 50 percent shortly after. Follow-up surveys conducted in these six communities after roundabouts had been in place for more than one year found the level of public support increased to about 70 percent on average.[12]

11. What are the impediments to building roundabouts?

Despite the safety and other benefits of roundabouts, as well as the high levels of public acceptance once they are built, some states and cities have been slow to build roundabouts, and some are even opposed to building them. The principal impediment is the negative perception held by some drivers and elected officials. Transportation agencies also have long been accustomed to installing traffic signals, and it can take time for deeply rooted design practices to change.

12. How common are roundabouts in the United States?

The first modern roundabouts in the United States were constructed in Nevada in 1990. Since that time, although the precise number of roundabouts is unknown, approximately 1,000 have been built. By comparison, there are about 20,000 roundabouts in France, 15,000 in Australia, and 10,000 in the United Kingdom. As of 2007 43 of the 50 states have modern roundabouts in operation. South Dakota is one of the seven states without a modern roundabout and that is soon to change with the completion of the modern roundabout at the University Center is Sioux Falls that is expected to be completed in the fall of 2008.

13. What are appropriate locations for roundabouts?

Roundabouts are appropriate at most intersections, including high crash locations and intersections with large traffic delays, complex geometry (more than four approach roads, for example), frequent left-turn movements, and relatively balanced traffic flows. Roundabouts can be constructed along congested arterials, in lieu of road widening, and can be appropriate in lieu of traffic signals at freeway exits and entrances.

14. What types of intersections may not be good candidates for roundabouts?

Roundabouts are not appropriate everywhere. Intersections that may not be good candidates include those with topographic or site constraints that limit the ability to provide appropriate geometry and those with highly unbalanced traffic flows (that is, very high traffic volumes on the main street and very light traffic on the side street).

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