Roundabouts

➢ Introduction

St. Louis County is concerned about the safety and well-being of its citizens. The mission of the St. Louis County Department of Highways and Traffic is to provide a modern, well-maintained and safe transportation system for our residents. We recognize that quality of life for neighborhood residents is impacted by speeding traffic, vehicle noise, cut-through traffic, and exhaust emissions. St. Louis County is committed to reducing traffic's negative effects while ensuring the overall safety and livability of residential neighborhoods.

To that end, St. Louis County is promoting the use of roundabouts at appropriate intersections as a replacement to other methods of control, such as four-way stops or traffic signals. Roundabout design has evolved in recent years. The modern roundabout eliminates left turns, allows for continuous traffic flow, and reduces speed. They enhance safety for pedestrians who are walking through the intersection. They are proven to be substantially safer for drivers of all vehicles to use. This guide further explains how roundabouts function and why we are promoting their use in St. Louis County.

➢ What is a roundabout?

▪ Definition

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A roundabout is a circular traffic intersection featuring:

- o Yield control on all entering roadway legs
- o One-way continuous flow within the circulatory roadway
- o Channelization of the approaching roadways
- o Appropriate geometric curvature to keep circulating speeds low

▪ How do roundabouts differ from older traffic circles and rotaries?

Halls Ferry Circle, St. Louis, MO

Manchester Rd and Taylor Rd, Wildwood, MO

	Older Traffic Circle	Modern Roundabout
Size	Much larger; Diameters could exceed 300 feet	Generally smaller; Diameters up to150 feet
Traffic Control	Stop control on entry, circulating traffic yields to entering traffic	Yield control on entry, entering traffic yields to circulating traffic
Speed	Generally in excess of 30 mph	Maximum speeds of 15-20 mph

➢ Why roundabouts?

▪ Safety

Several features of roundabouts promote safety. At traditional intersections with stop signs or traffic signals, there are a total of 32 vehicle-to-vehicle conflict points, please refer to Figure 1. At traditional intersections, the most common types of crashes are right-angle, left-turn, and head-on collisions. These types of collisions can cause severe damage because vehicles may be traveling through the intersection at high speeds and will impact less protected areas of a vehicle.

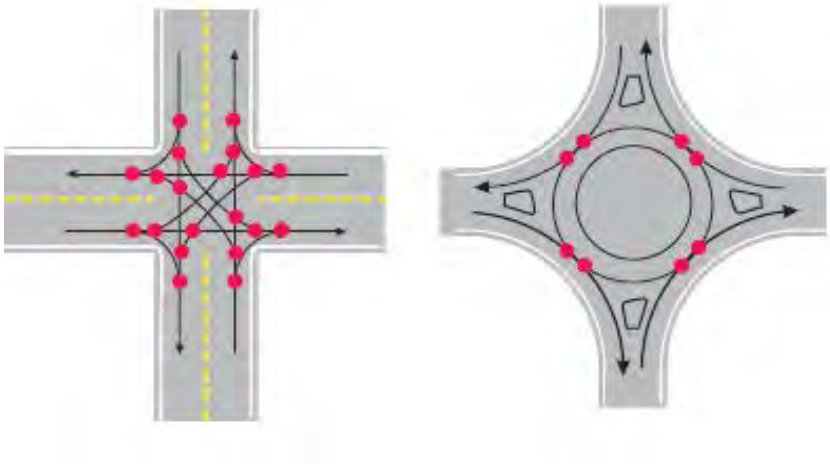


Figure 1-Vehicle to Vehicle Conflict Points in a Traditional Intersection vs. Modern Roundabout

With roundabouts, the total number of vehicle-to-vehicle conflict points is reduced to 8. Potentially serious crashes are essentially 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 — generally less than 20 mph in urban areas.

A 2001 Insurance Institute for Highway Safety (IIHS) 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.

Safety for pedestrians is also improved. Studies in Europe indicate that, on average, converting conventional intersections to roundabouts can reduce pedestrian crashes by about 75 percent. Single-lane roundabouts, in particular, have been reported to involve substantially lower pedestrian crash rates than comparable intersections with traffic signals

▪ Congestion Mitigation

Several studies conducted by IIHS and others have reported significant improvements in traffic flow following conversion of traditional intersections to roundabouts. We can recognize the improvement in traffic flow by measuring a reduction in delay – the amount of time you spend waiting to get through an intersection and by the elimination of necessary stopping. A study of 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. A study 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. 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.

▪ Environmental Impacts

Waiting to get through an intersection and starting up from a stop burns extra fuel and increases emissions. Because roundabouts improve the traffic flow, they also reduce fuel consumption and vehicle emissions.

In one IIHS study, replacing a signalized intersection with a roundabout reduced carbon monoxide emissions by 29 percent and nitrous oxide emissions by 21 percent. 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.

Constructing roundabouts in place of traffic signals can reduce fuel consumption by about 30 percent. At 10 intersections studied in Virginia, this amounted to more than 200,000 gallons of fuel per year.

▪ Aesthetics

Landscaping the central island creates attractive focal and entrance points within a community. Planting low maintenance trees and shrubs offers a distinguishing feature that gives a modern roundabout an aesthetic advantage over most conventional intersections. In addition, landscaping increases public safety by lowering speeds as drivers approach an intersection. This is accomplished as visuals and contrasting colors send a subconscious message to drivers, cueing them to decelerate their vehicles as they approach the intersection. Though the central island may be an attractive focal point, we do not encourage it to be used as a park, playground or pedestrian refuge. Figure 2 is an example of landscaping in the center island of a roundabout located in Chesterfield, Missouri.

Figure 2. River Valley Drive, Chesterfield, Missouri

- **Where are the roundabouts in Missouri?**
  - St. Charles
  - Columbia - http://www.gocolumbiamo.com/PublicWorks/Traffic/roundabouts.php
  - Kansas City
  - St. Louis
    - South County: Lemay Casino
    - Chesterfield: 141 and Outer 40
    - Chesterfield: River Valley
    - Hampton and Wells

- **How do I drive through a roundabout?**

  - **Step-by-Step instructions with illustrations**

  Roundabouts are designed to make intersections safer and more efficient for drivers, pedestrians and cyclists. There are two types of roundabouts: Single-lane roundabouts and multi-lane roundabouts.

There are a few key things to remember about driving roundabouts:

- Yield to drivers in the roundabout
- Stay in your lane; do not change lanes
- Do not stop in the roundabout
- Avoid driving next to oversize vehicles

Driving single-lane roundabouts

As you approach a roundabout, you will see a yellow "roundabout ahead" sign with an advisory speed limit for the roundabout.

Slow down as you approach the roundabout, and watch for pedestrians in the crosswalk.

Continue toward the roundabout and look to your left as you near the yield sign and dashed yield line at the entrance to the roundabout. Yield to traffic already in the roundabout.

Figure 3. Single Lane Roundabout 1

Once you see a gap in traffic, enter the circle and proceed to your exit. If there is no traffic in the roundabout, you may enter without yielding.

Look for pedestrians and use your turn signal before you exit, and make sure to stay in your lane as you navigate the roundabout. Figure 3 is an example of a single lane roundabout.

This is a link to the Arizona Department of Transportation (ADOT) Roundabout website & video.
http://www.azdot.gov/CCpartnerships/roundabouts/AZ_Roundabouts.asp

Driving multi-lane roundabouts

In a multi-lane roundabout, you will see two signs as you approach the intersection: The yellow "roundabout ahead" sign and a black-and-white "lane choice" sign. You will need to choose a lane prior to entering the roundabout.

You choose your lane in a multi-lane roundabout the same way you would in a traditional multi-lane intersection. To go straight or right, get in the right lane. To go straight or left, get in the left lane.

Figure 4. Dual Lane Roundabout

Drivers can also make U-turns from the left lane. Figure 4 (*see page 5*) is an example of a dual lane roundabout.

The graphics illustrated in Figure 5 show what turns can be made in multi-lane roundabouts. The arrows in yellow show the movements that can be made from the right lane, and the arrows in green show the movements that can be made from the left lane.

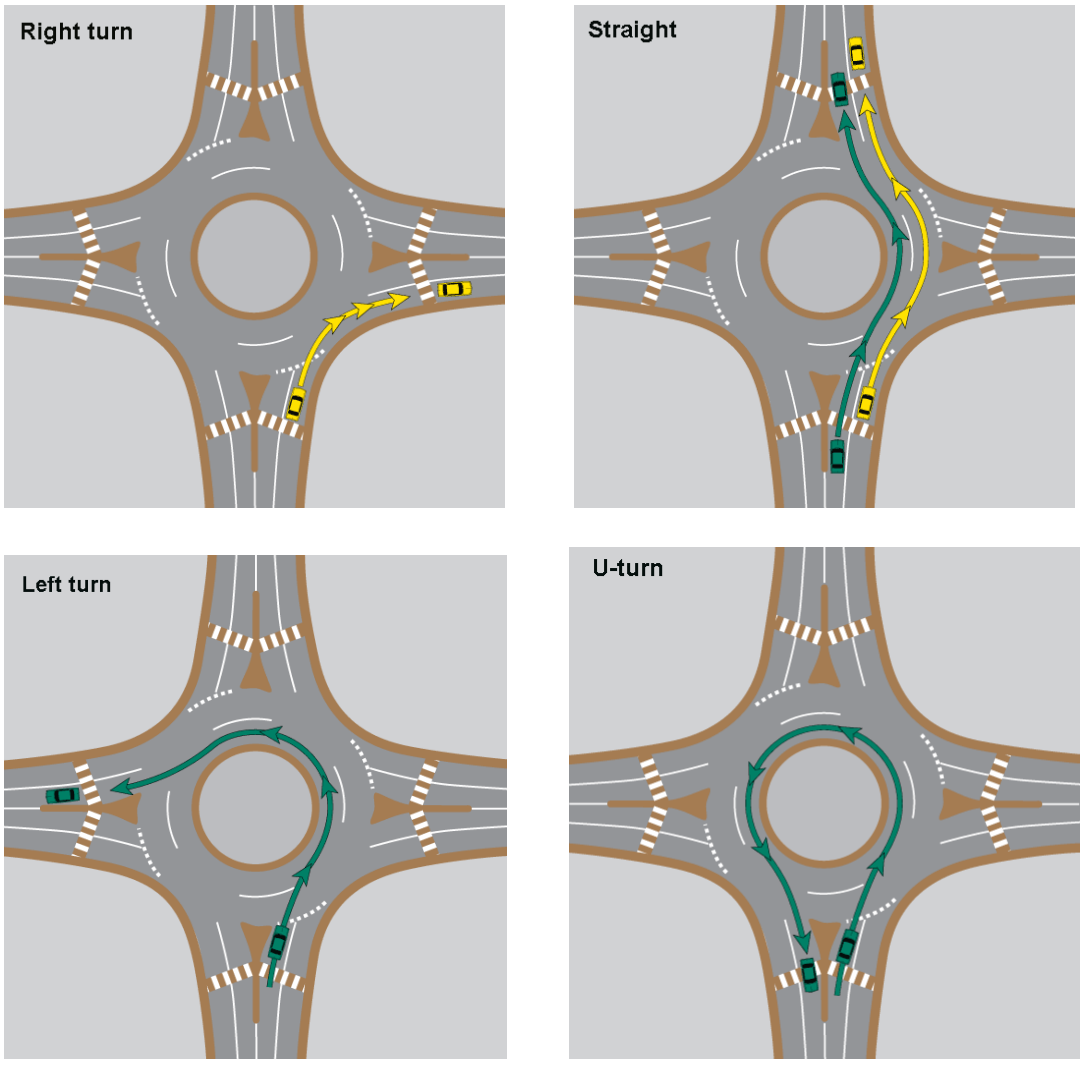


Figure 5. Illustration of all turning movements in a roundabout.

Once you have selected your lane, watch for pedestrians in the crosswalk as you approach the roundabout.

At the dashed yield line, look to your left and yield to drivers already in the roundabout. Remember, in a multi-lane roundabout, you must yield to **both lanes** of traffic.

Once a gap in traffic appears, merge into the roundabout and proceed to your exit. Look for pedestrians and use your turn signal before you exit. If there is no traffic in the roundabout, you may enter without yielding.

Trucks / oversize vehicles and roundabouts

Roundabouts are designed to accommodate vehicles of all sizes, including fire trucks, ambulances, buses, farm equipment and semi trucks with trailers. Oversize vehicles and vehicles with trailers may straddle both lanes while driving through a roundabout.

Many roundabouts are also designed with a truck apron, a raised section of pavement around the central island that acts as an extra lane for large vehicles. The back wheels of the oversize vehicle can ride up on the truck apron so the truck can easily complete the turn, while the raised portion of concrete discourages use by smaller vehicles. Figure 6 shows a truck utilizing a roundabout.

Figure 6. Truck turning in a roundabout

Because large vehicles may need extra room to complete their turn in a roundabout, drivers should exercise caution while driving next to large vehicles in a roundabout.

See the Arizona Department of Transportation (ADOT) Roundabout website and video.

➢ Where are we considering roundabouts?

- St. Louis County: Old Halls Ferry Road and Vaile Avenue

➢ What are common concerns with roundabouts?

▪ Pedestrian Safety

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. Single-lane roundabouts, in particular, have been reported to involve substantially lower pedestrian crash rates than comparable intersections with traffic signals.

- **Older Driver Safety**

Age-related declines in vision, hearing, and cognitive functions, as well as physical impairments, 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 2008, 37 percent of drivers 70 and older in fatal crashes were involved in multiple-vehicle intersection crashes, compared with 22 percent among drivers younger than 70. Older drivers' intersection crashes often are due to their failure to yield the right-of-way. Particular problems for older drivers at traditional intersections include left turns and entering busy thoroughfares from cross streets. Roundabouts eliminate these situations entirely. A 2007 study in six communities where roundabouts replaced traditional intersections found that about two-thirds of drivers 65 and older supported the roundabouts. Although safety effects of roundabouts specifically for older drivers are unknown, the 2001 Institute 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 may not pose a problem for older drivers.

- **Cyclists**

Roundabouts can easily accommodate bike riders of all skill levels. Though the pavement width is adequate to “Share the Road” with vehicles, we recommend riding in the center of the lane. Riding in the center of the lane eliminates the potential problems of wide turning cars and longer trucks that require more pavement to turn. The slower speed limits in a roundabout make it safe for both cars and bicycles to go through a roundabout in single file.

- **Land Requirement (footprint)**

Roundabouts do not necessarily require more space than traditional intersections. Geometric design details vary from site to site and must take into account traffic volumes, land use, topography, and other factors. 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. In some cases, roundabouts can require more space than traditional intersections to accommodate the central island and circulating lanes, but approaches to roundabouts typically require fewer traffic lanes and less right-of-way. The following example from Asheville, North Carolina, illustrates that roundabout dimensions can be compatible with those of traditional intersections.

Before **After**

Figure 7. Before and After footprint comparison of a traditional intersection vs. a roundabout

- **Emergency Response**

When designed correctly, modern roundabouts accommodate all emergency response vehicles without additional delay to response times, including large ladder trucks (fire engines) used by some municipalities and townships.

The City of Vail, Colorado was one of the first municipalities in the country to construct a modern roundabout back in the mid 1990's. John Gallic, the city's assistant fire chief, stated the modern roundabouts improved emergency response times over the stop signs and traffic signals, and that drivers usually did not stop within the roundabout. If they did, he stated they were able to coax the drivers into moving out of the intersection using their signals and horns.

- **Snow Removal**

Located in all areas of our country and in Europe, roundabouts are exposed to all weather patterns possible. Snow removal in a roundabout is no more difficult than at a typical intersection. Drivers are always cautioned to drive carefully in inclement weather and slick driving conditions. As with a typical intersection, we are not able to remove snow from the sidewalks.

➢ What do other communities think about roundabouts?

American motorists often say they don't like roundabouts, but the experience quickly wins them over. This is a main finding of a new survey conducted for the Institute. Twice as many drivers favor roundabouts after installation, compared with before.

Researchers first surveyed drivers in three communities in Kansas, Maryland, and Nevada where roundabouts were to be constructed. Follow-up surveys conducted a few months after installation show opinions had changed dramatically. The proportion of drivers in favor doubled overall, from 31 percent before construction to 63 percent after. Those who were strongly opposed dropped from 41 percent to 15 percent.

Each time drivers were surveyed, those against roundabouts were asked the reasons for their opposition. About one-third of opposed drivers in the first survey said they would prefer a new traffic signal or to keep the stop signs that were already in place. Another 40 percent cited concerns about safety or confusion at the new intersections. After the roundabouts were constructed, objections were similar but only half as many drivers were opposed.

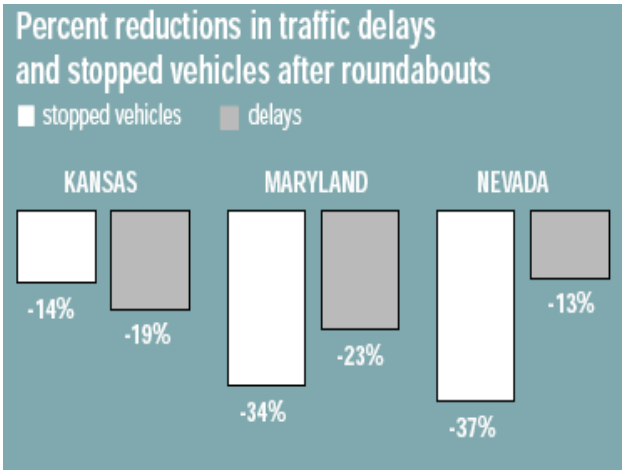
Before and after construction, drivers were asked about the impact of roundabouts on congestion and safety. Before construction, 27 percent of the drivers thought congestion would be reduced. After construction, 42 percent thought it had been reduced. About a third of the drivers questioned before construction thought there would be a safety improvement, and the proportion increased to 50 percent after roundabouts were installed.

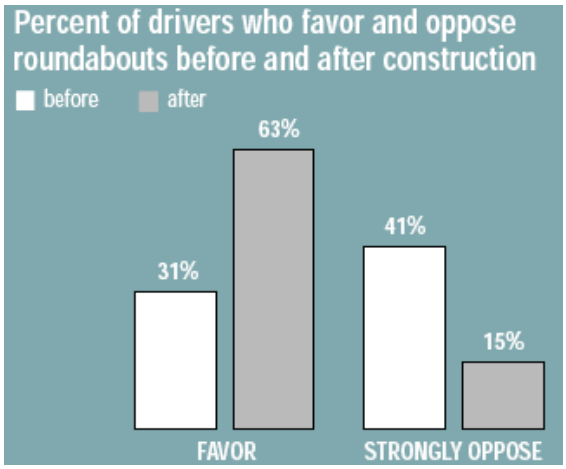
"Many drivers simply prefer the traffic controls they're more familiar with. There's a natural resistance to the unknown," says Richard Retting, the Institute's senior transportation engineer. "Still, some of the concerns we heard are based on real misunderstandings." For example, far from being inherently unsafe, roundabouts significantly *reduce* crashes (see Status Report, May 13, 2000; on the web at www.highwaysafety.org).

Communication is important to overcome biases and build support for roundabouts before they're operational, Retting also notes. But this only goes so far, because, for many people, seeing is believing. Eugene Russell, professor at Kansas State University's Department of Civil

Engineering and a co-author of the study, says that "at first communities say, 'We don't want roundabouts here. We don't need them just because England or France has them.' But after the roundabouts are in, communities like them because they work."

This is precisely what occurred in University Place, the first city in Washington State to build a modern roundabout. Public Works Director Steve Sugg says a demonstration was important to secure wide support. "Initially we had to overcome strong public opposition," he says. "To try something this new and innovative required a heck of a lot of public involvement — more than I had ever been exposed to in my career. But in the end, people came around, and all of that effort paid off. Now we have five roundabouts, and they're actually a source of pride for the citizens in the community."





- **What do you want to know about roundabouts?**

  Email us at: HPlanning@stlouisco.com

- **Governmental Agencies & Professional Organization Resources**

  - Caltrans - California DOT
  - City of Kirkland Washington - Info on Traffic Calming
  - Insurance Institute for Highway Safety
  - Federal Highway Administration - Access to the FHWA Guide Book
  - FHWA - Roundabout Safety Comes to America (article by Ourston & Bared)
  - Kansas DOT
  - Kansas State University Traffic Discussions & Roundabouts
  - Maryland DOT - Traveling Maryland's Roundabouts
  - New York DOT - Great Info and Links
  - Oregon DOT - Access to Roundabout Info
  - Tooele County, Utah
  - TRB Conference Papers/Presentations
  - Waterloo Canada - Info on Roundabouts
  - Wisconsin DOT

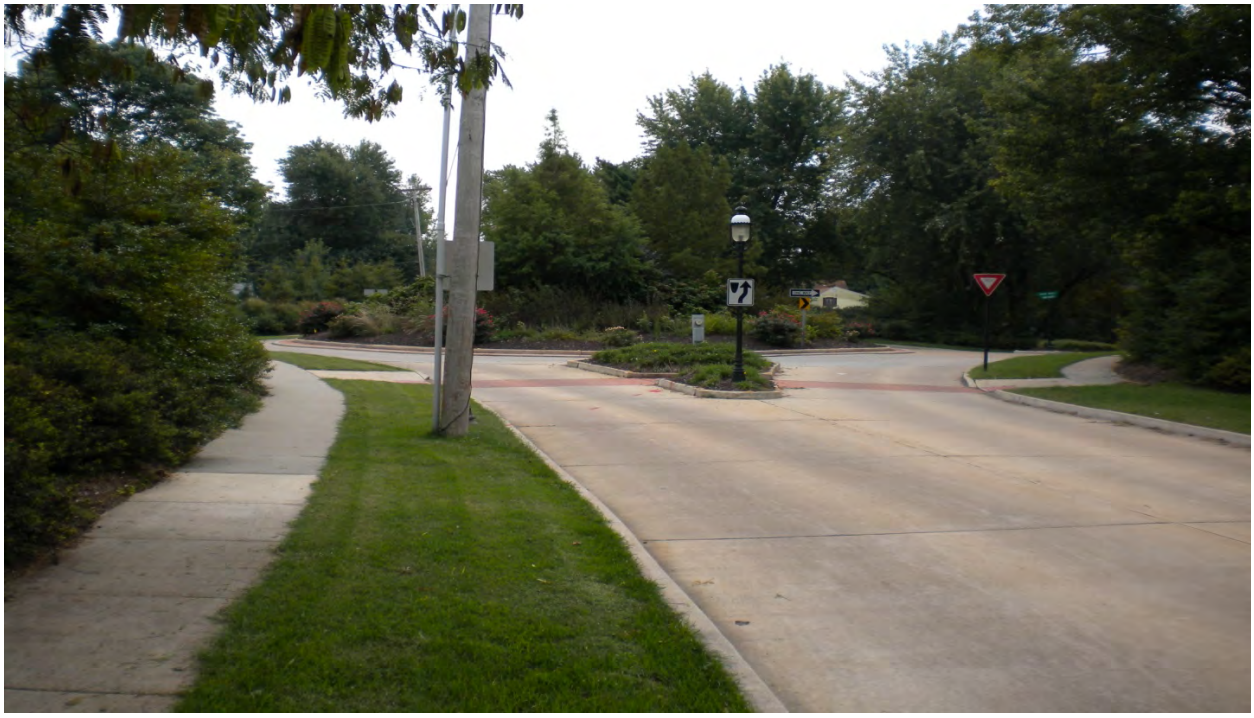
I-64 and Spoede

Roundabouts were used on the I-64 ramps at Spoede to allow for improved access over the folded diamond that had been at this location previously.

MO 141 and Woods Mill

This roundabout allowed access between the relocated Highway 141 and the old Woods Mill Road. This design allowed for the intersection to fit in the narrow space between the parallel roadways and allow continuous flow from all directions without the need to stop traffic, which could then back up onto the expressway.

Woods Mill Road and Town and Country Crossing Drive



River Valley Drive and River Bend Drive

This roundabout was installed as a traffic calming measure. The plantings in the center island serve both to beautify the installation and to influence drivers to drive more cautiously by obscuring sight through the intersection so that they must slow down to avoid potential conflicts.