Common Modern Roundabout Myths

There are many myths and misperceptions citizens hear about modern roundabouts while talking with friends, neighbors and community leaders, or researching the subject matter on the internet. Sometimes not everything you read or hear is necessarily true. This document is intended to help educate readers on the facts of modern roundabouts.

Much of the information within this document was obtained from representatives at DLZ Michigan, Inc. Their staff authored a paper titled "Common Misperceptions about Modern Roundabouts" which was published in the American Planning Association journal *Transportation Planning* in addition to making numerous presentations at workshops and educational seminars on this subject. The Washtenaw County Road Commission would like to thank DLZ for their permission to publish this information in an effort to educate others on the facts of modern roundabouts. Reproduction of this document without written consent from DLZ Michigan, Inc. and the Washtenaw County Road Commission is prohibited.

Myth #1 Modern roundabouts are the same as traffic circles and rotaries

This is a very common misunderstanding. Rotaries, predominantly found in the northeastern region of the United States, are much larger in diameter when compared to modern roundabouts. In order to enter or exit a rotary, a driver must merge or "weave" with high speed entering or circulating traffic. These maneuvers can result in high speed crashes under some circumstances. Weaving can also create gridlock within the rotary during peak hours of operation. To counteract these effects, many DOT and local road authorities have retrofitted these intersections with traffic signals or have converted them into modern roundabouts as shown in the images below.

A rotary intersection in Kingston, New York (left). This intersection was later converted to a modern roundabout (right). The rotary (outside circle) was removed once the modern roundabout was completed. Notice the difference in size between the two central islands.

Images courtesy of New York Department of Transportation

Traffic circles exist in various shapes and sizes. Some have very large central islands, which promote higher entering, circulating and exiting speeds. In addition, many traffic circles do not have splitter islands at their entry points to slow traffic speeds or provide refuge to pedestrians. It is common to find multiple approach roads or "spokes" at traffic circles that further degrade traffic safety and capacity.

Images of well known traffic circles clockwise from upper left include the L'Arc De Triomphe (Paris, France); Columbus Circle (New York City); DuPont Circle (Washington D.C.); and St. Armand's Circle (Sarasota, Florida)

An example of a traffic circle in Michigan can be found at the intersection of M-227 (Old US-27) and Michigan Avenue (I-94 Business Loop) in the City of Marshall. Serving as an entry point into the downtown district, the Brooks Memorial Fountain stands within the island of the circle. It is common to encounter artistic features such as fountains, statues, and other types of art within the island of a traffic circle. This particular location serves as a park for the community. Many weddings are performed within the island during the spring/summer season. On summer evenings, the island is often bustling with visitors gazing at the color changing water of the fountain.

(Left image courtesy of the City of Marshall)

Images of the Brooks Memorial Fountain; Marshall, Michigan.

As can be seen in the images below, crossing the roadway to gain access to the island of a traffic circle is sometimes permitted and encouraged with the aid of marked crosswalks so pedestrians can enjoy the features within the island.

Another significant difference between traffic circles and modern roundabouts is some traffic circles allow for parking within the circulating roadway. This activity can decrease the overall level of service of an intersection during peak hours.

Image of parked vehicle at the Marshall, Michigan traffic circle.

Although modern roundabouts are commonly mistaken as traffic circles and rotaries, it is important to understand the unique differences between the three intersections. The combination of using a smaller inscribed circle diameter (ICD) and splitter islands (used to deflect traffic) reduce entry and exit speeds to 15 to 25 MPH. The entry is also controlled by the "yield to left" principle, meaning cars circulating within the roundabout have the right-of-way over entering vehicles. This optional principle eliminates traffic gridlock within the circulating roadway during peak hours of the day. Other significant differences are shown in the table below.

Major Differences between Traffic Circles/Rotaries and Modern Roundabouts

Characteristic	Traffic Circle/Rotary	Modern Roundabout
Diameter or ICD	600+ feet	130 – 250 feet
Entry Control	Circulating vehicles yield to entering vehicles/High speed merge	Entering vehicles yield to circulating vehicles
Speeds	High (30-55 MPH)	Low (15-25 MPH)
Lane Utilization	Weaving	Stay in your lane
Traffic Capacity	Can lock up during high capacity hours (A.M./P.M. peak hours)	Determined by geometric layout and gaps – Can have very high capacity rates if designed correctly
Crash Rates	Typically high at medium to higher rates of speed	Very low – mostly low impact collisions such as sideswipes
Public Opinion	Negative	Typically favorable after implementation

Table Courtesy of DLZ Michigan, Inc.

The central island at most modern roundabouts are not enhanced with objects that will entice or encourage pedestrians to cross the circulating roadway. This is a significant difference because modern roundabouts are designed to encourage pedestrian crossings at designated roadway approaches where accessible sidewalk ramps and marked crosswalks are present. The splitter islands located at each road approach provide refuge for pedestrians in the center of the roadway where crossing is permitted. Modern roundabouts also prohibit parking within the circulating roadway or approaches.

Examples of landscaping enhancement at modern roundabout intersections.

The most important thing to remember is a modern roundabout intersection is neither a traffic circle nor a rotary.

Myth #2 Modern roundabouts should not be used at high-speed intersections

A common misconception held by many citizens and traffic engineers is if an intersection has high-speed approaches, a modern roundabout should not be constructed at that location. Studies in the United Kingdom (U.K.) have found just the opposite to be true. Placing a modern roundabout at these locations in most cases *increased* safety by *reducing* traffic crashes.

Two good case studies from the United States support the U.K. studies findings:

Paola, Kansas – State Route 68 @ Old KC Road

This intersection is located on very flat topography. All approach speeds are 65 MPH. Between the years 1993 and 1997, the intersection was controlled as a two-way stop. During that period, the intersection experienced 25 injury crashes, an average of five per year. In 1998, stop signs were installed on all four approaches. Once this occurred traffic crashes and injuries significantly reduced but the overall level of service, or the capacity the intersection provides to the motoring public, was deemed less than desirable. In 2001, the Kansas Department of Transportation constructed their first modern roundabout at this intersection. Since opening to traffic in 2001, officials reported three low speed crashes (property damage only) between the years 2001-2003, and a 77% reduction in intersection delay from 19 seconds to 5.5 seconds.

Before and after images of a high speed intersection in Paola, Kansas that was converted into a modern roundabout (State Route 68 @ Old KC Road)

Images courtesy of Center for Transportation Research and Training – Kansas State University

Scott County, Minnesota – State Highway 13 @ County Road 2

All approach speeds at this intersection are 55 MPH. Prior to a modern roundabout being installed, the intersection was controlled as a two-way stop. Prior to converting the intersection to a modern roundabout, 50 injury crashes were reported over a five-year period, two of them resulting in fatalities. Twelve months after the roundabout was opened to traffic, one low speed crash occurred (property damage only). There have been no injuries reported at this location since the roundabout was implemented.

State Highway 13 @ County Road 2 in Scott County, Minnesota
Image courtesy of the Minnesota Department of Transportation

When designed correctly, modern roundabouts can be used as an effective tool to reduce vehicular crash rates and in most cases eliminate critical, life threatening injuries at high-speed approach intersections.

Myth #3: Roundabout construction and right-of-way costs are higher than traffic signals.

This is not always true. The answer depends upon current land zoning, existing conditions of the land being purchased, projected 20-year traffic volumes/turning movements at the intersection being studied, and existing conditions of the roadway at and near the intersection.

Although hard to believe by some, overall modern roundabout project costs can be less than signalized intersection improvement projects. When designing an intersection improvement, the engineer typically accommodates projected 20-year traffic volumes and turning movements. If heavy left turning patterns are projected at an intersection, either a significantly long left turn storage lane or shorter, multiple left turn storage lanes are required to provide acceptable levels of service for the 20-year design period (LOS 'D' or better). This translates into additional impervious surface, which is viewed by many as a negative to the environment. Wider intersections also expose pedestrians to traffic for longer durations since they have additional lanes to cross. Wider intersections also equate into additional right-of-way purchases.

If an intersection is being considered for an improvement project, a comparative alternative analysis should be performed early in the preliminary stages to select a preferred alternative that will meet the needs and objectives of the improvement while also being cost effective and friendly to the environment.

Myth #4 Modern roundabouts are unsafe for inexperienced and older drivers

Roundabouts and Older Drivers

Older drivers need more time to evaluate situations and react to the information they have processed. In many instances, modern roundabouts provide this need to elderly drivers. Lower operating speeds at these intersections provide additional perception/reaction time, which helps elderly drivers anticipate and adjust to the movements of other vehicles and pedestrians. Furthermore, a 75 percent reduction in

conflict points over conventional intersections (signalized and unsignalized) simplifies decision making for this demographic.

The construction of modern roundabouts in communities with a high percentage of retirees is becoming very popular, especially in Florida and Arizona. For example, Clearwater, Florida has the highest proportion of 65 or older residents of any U.S. city with populations of 100,000 or more. The City of Clearwater has built five roundabouts since 2000 and has twelve more in various design phases. All but the first one were proposed by, and strongly supported by residents.

Image courtesy of Ken Sides

Typical circulating speeds in Clearwater's roundabouts such as this one are about 15 MPH. Approach speeds (measured at the crosswalks) are approximately 20 MPH.

A recent article published by the Federal Highway Administration in *Public Roads Magazine* (January/February 2007; Vol. 70; No. 4) Titled "*Older Drivers at a Crossroads"* stated roundabouts are less complicated for elderly drivers than conventional intersections controlled by stop signs or traffic signals for several reasons:

- Traffic approaches from one direction.
- Color-coded signals are generally not used at modern roundabouts.
- Pedestrian and vehicular conflicts are separated by placing the crosswalk behind the yield line. This allows the driver to focus on one task at a time.
- Most roundabout designs require drivers to turn their head 30 degrees to analyze and process slower moving vehicles circulating from the left as opposed to 90 degrees at higher speed intersections where traffic is approaching in both directions.
- Roundabouts eliminate the need to judge oncoming gaps when turning left at an intersection.

Roundabouts and Inexperienced Drivers

Modern roundabouts are becoming more popular to use at or near high schools throughout the United States to calm traffic, provide higher levels of safety to students and parents, and higher levels of service during peak hours of the day. Within the State of Michigan, there are four modern roundabouts located at or near the entrances to public high schools, with two more locations slated for construction in 2007.

Locations where roundabouts are currently present at/near high schools

High School	Intersection	Location
Gaylord H.S.	Old US-27 @ Livingston Blvd.	Gaylord, MI
Saline H.S.	Campus Parkway @ Suncrest Dr. Campus Parkway @ Community Dr.	Saline, MI
Stoney Creek H.S.	Tienken Road @ Sheldon Rd.	Rochester Hills, MI

Locations where roundabouts are proposed for construction at/near high schools in 2007

High School	Intersection	Location
Chippewa Valley H.S.	Romeo Plank Road @ 19 Mile Road	Clinton Twp., MI
Skyline H.S.	M-14 @ Maple Road	Ann Arbor, MI

There is no before crash data to provide for the Campus Parkway roundabouts since they were constructed as part of the school development. However, since opening to traffic in 2004, there has been one reported minor crash at the Suncrest Drive roundabout. No injuries were reported.

At Old US-27 at Livingston Blvd. near Gaylord High School, there were 20 crashes reported between the years 1994-2003, with five of those incidents involving serious injuries. The public desired to have a traffic signal installed at the intersection but sufficient traffic warrants were not present to support its installation. The Otsego County Road Commission elected instead to install a modern roundabout to address safety concerns. The roundabout was opened to traffic prior to school resuming class in the fall of 2006. To date, there have been no crashes or injuries reported at the intersection.

Although data is limited, the results available indicate that inexperienced and newer drivers understand and navigate modern roundabouts very well.

Image of a student driver navigating the Campus Parkway modern roundabout at Community Drive.

Myth #5: Roundabouts are unsafe for pedestrians

Modern roundabouts are as safe, and are usually safer for pedestrians of all ages than conventional signalized and unsignalized intersections. Numerous studies have shown that roundabouts have fewer injury-related crashes when compared to conventional intersections, and most studies show that the overall crash rate is reduced when conventional intersections are replaced with roundabouts. Further, pedestrian death and serious injury rates are lower at roundabouts than at conventional intersections.

Pedestrian safety is an issue of perceived versus real risks. In general, pedestrians have a higher ***perception*** of safety at stop sign and traffic signal locations because they ***assume*** traffic will stop for them. Experience has shown that pedestrians accept a false sense of security from traffic signals and stop signs when crossing a roadway. When at modern roundabout intersections, some pedestrians sense the crossing maneuver is not as safe as at conventional intersection locations since those aids are typically not present. However, experience indicates that this environment generally increases the pedestrian's level of awareness prior to crossing the roadway, thereby increasing their level of safety.

There are four key points that help explain why roundabouts in many instances are more pedestrian friendly than other conventional intersections:

1) The number of vehicle to pedestrian conflict points at a typical intersection reduces from 24 to 8 locations at a modern roundabout. This reduces potential pedestrian collisions by 67%.

2) At conventional intersections, marked crosswalks (if present) are placed five feet in advance of the stop bar. This places pedestrians in front of drivers who are simultaneously looking for a gap in traffic to continue their maneuver. At modern roundabouts, the marked crosswalk is placed one car length (about 20 feet) behind the yield line. Placing crosswalks behind the yield line separates the two tasks, thereby simplifying decision making for the driver and the pedestrian.

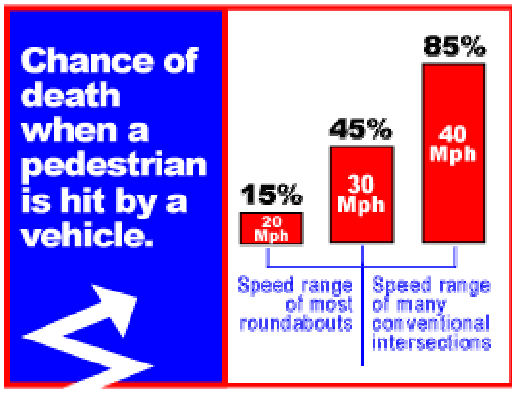
Left image courtesy of the Ingham County Road Commission

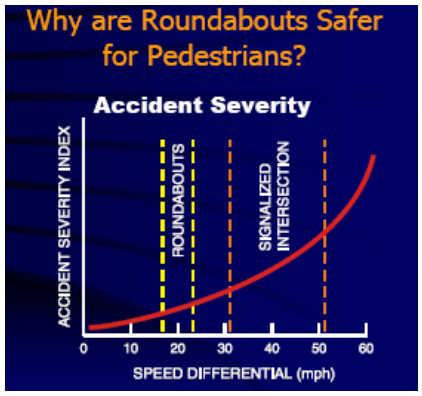
Image to the left shows the placement of the crosswalk behind the yield line. The image to the right shows a crosswalk in advance of the stop bar at a signalized intersection.

3) In addition to deflecting traffic to reduce vehicle speeds, splitter islands also act as pedestrian refuge islands. This feature permits pedestrians and other non-motorized users to cross the road in two stages instead on one, thereby reducing their exposure to oncoming traffic in the roadway since distances are shorter. Splitter islands also decrease the complexity for pedestrians to cross the roadway since they only have to focus on one direction of oncoming traffic at a time.

The left image is a view of a pedestrian refuge island in the City of Ann Arbor. Refuge islands are considered by many traffic engineers and pedestrians as a safer way to cross high speed, multilane roadways since pedestrians can focus on one direction of traffic at a time. Splitter islands at modern roundabouts serve the same purpose. The image to the right displays students crossing at the Campus Parkway/Suncrest roundabout.

4) Because properly designed roundabout geometry reduces entry and exit speeds, a pedestrian is more likely to survive a collision with a vehicle at a modern roundabout than at other intersections. Per a study conducted by the United Kingdom Department of Transportation, a pedestrian's chance for survival is drastically reduced as collision speeds increase beyond 30 MPH. Vehicle speeds in excess of 40 MPH are typical at traffic signals, especially if a driver is attempting to "beat" a red light. Since roundabout entry and exit speeds are designed for lower speeds, the likelihood of survival and recover are greatly increased.





Source: U.K. Department of Transportation, *Killing Speed and Saving Lives*, London, 1987.
Graphics courtesy of Alaska Roundabouts (left) and Ourston Roundabout Engineers (Right)

Modern roundabouts are also being constructed near elementary schools throughout the United States. Here in Michigan, modern roundabouts have been installed at or near three different elementary schools.

Elementary School	Intersection	Location
Bennett Woods	Bennett Rd. @ Hulett Rd.	Okemos, MI
Beck Centennial	25 Mile Rd. @ Hayes Rd.	Utica, MI
Harvest	Campus Parkway @ Community Dr.	Saline, MI

At Bennett Woods Elementary School, many parents had concerns that the proposed roundabout would not be safe for school-aged children. After the roundabout was opened to traffic, Jeri Mifflin, Principal of Bennett Woods Elementary stated, *"It (the roundabout) has improved the flow of traffic and has not proved to be a safety concern that several parents feared."*

Since opening to traffic in 2004, there have been no reported crashes at the Campus Parkway modern roundabout in front of Harvest Elementary School in Pittsfield Township, Michigan.

Images Courtesy of Missoula Institute for Sustainable Transportation

Keck Circle in Montpelier, Vermont. The roundabout is located 500 feet from Main Street Middle School. Studies show an average of 260 pedestrians using the modern roundabout during the A.M. and P.M. peak periods during school days.

Myth #6: The public will not embrace modern roundabouts

In many cases, once a road agency or municipality announces they are considering a modern roundabout intersection improvement project, the public questions the judgment of the governing body or is skeptical the roundabout will be efficient and/or be a safe intersection alternative for a variety of reasons. What history has taught many traffic engineers and elected officials over the past ten years is that this opinion drastically changes three to six months after the roundabout is opened to traffic.

The National Cooperative Highway Research Program conducted a study to determine public acceptance of modern roundabouts at 22 different locations in 11 states (NCHRP Synthesis 264). In all but one case, the public attitude toward roundabouts improved after it was opened to traffic. Whereas before construction, 68 percent of the responses were negative or very negative toward the proposal of a modern roundabout. After construction, 73 percent of the respondents indicated a positive or very positive opinion of the modern roundabout.

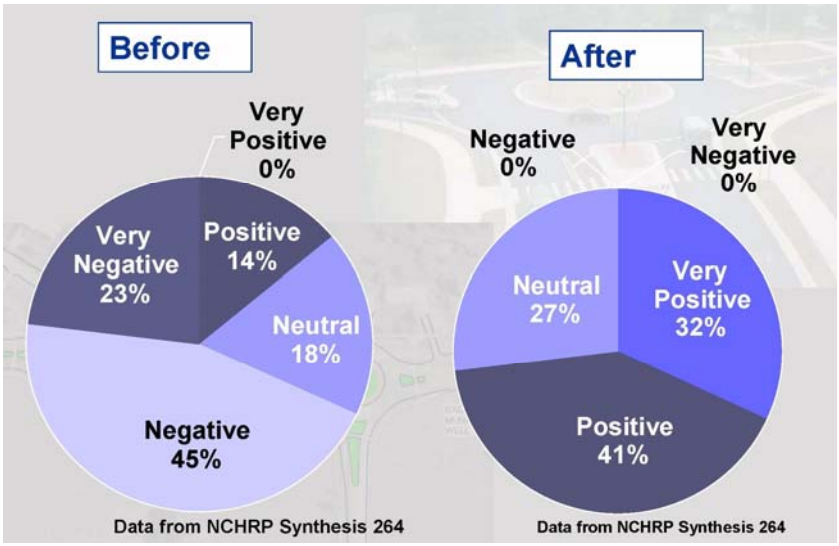


Diagram courtesy of DLZ Michigan, Inc.

Myth #7: Roundabouts will make congestion worse than a traffic signal

A common misunderstanding about modern roundabouts is that they are unable to accommodate large numbers of vehicles during peak hours of the day, especially if commercial trucks are present. This has been found to be false. When selected and designed correctly, modern roundabouts usually outperform signalized intersections.

A good example of this can be found at the intersection of M-53/Van Dyke Road/18-1/2 Mile Road in the City of Sterling Heights, MI. This intersection is under the jurisdiction of the Michigan Department of Transportation. This intersection and the entire road network surrounding the area were reconstructed in 2005 to relieve congestion on a very overwhelmed road system. Engineers and planning officials projected that 30,000 vehicles per day (VPD) would use the roundabout on "opening day", and about 45,000 VPD would be present at the intersection by the end of the 20-year design life (2025).

To everyone's astonishment, one year after the roundabout was opened to traffic, MDOT traffic studies indicated the average daily traffic count was 47,000 VPD. This was 2,000 VPD higher than the estimated twenty-year design life one year into existence. MDOT officials underestimated the popularity of the new road network. The roundabout is estimated to function at a level of service (LOS) 'A' using the current day count, meaning there is plenty of additional capacity remaining to accommodate future growth in the area.

Aerial image of the M-53 @ Van Dyke Road / 18-1/2 Mile Road Roundabout
Image courtesy of the Michigan Department of Transportation and The Road Commission for Oakland County

Myth #8: Roundabouts cannot accommodate large trucks or emergency response vehicles

When designed correctly, modern roundabouts can accommodate large commercial trucks that use the interstate transportation system and fire trucks. Within the central island, it is common to find a widened concrete pad, or truck apron, used to accommodate wheel tracking behind the back of curb.

Images of concrete aprons provided around the perimeter of the central island.

Image of a WB-62 semi-trailer using the M-81 roundabout in Saginaw. The concrete apron is provided for trucks in the event they cannot make the counterclockwise movement within the circulating roadway.

In Saginaw, MI, two modern roundabouts were constructed by the Michigan Department of Transportation in the fall of 2006 to accommodate a large number of truck movements from two truck plazas located on both sides of Interstate Highway 75. It is estimated that 6-8 percent of the average daily traffic is commercial trucks. To date, there have been very few reported incidents (property damage only) at the two junctions. In addition, no significant complaints have been lodged by the trucking industry or the owners of the two truck stops for implementing roundabouts.

Aerial view of the M-81 roundabouts at Interstate 75, Saginaw, MI
Image courtesy of Aerial Imaging Solutions

When designed correctly, modern roundabouts also 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. Mr. John Gallic, Assistant Fire Chief for the City 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.

Images of an ambulance navigating the M-81 modern roundabout at I-75, Saginaw, MI on the left and fire trucks at a modern roundabout in Washington State on the right (right image courtesy of Washington Department of Transportation).

In addition, Police Chiefs are beginning to favor modern roundabouts over signalized intersections in some instances. In a news article from the Detroit News dated December 19, 2006 titled *Circular Roadways handle Shoppers*, Green Oak Township Police Chief Bob Brookins stated the following about the Lee Road roundabouts at US-23 in Livingston County, Michigan:

> *"They (the roundabouts) are working. They're pushing through a lot of traffic and pushing it slower. I think it is a significant benefit…Traffic at the exit (from US-23) has increased 17 percent in the last two years and is expected to go higher. Traffic from US-23 used to back up onto the expressway while trying to get through the former intersection. That doesn't happen anymore, not even during the shopping rush on Thanksgiving weekend."*

During the 2006 Thanksgiving Day weekend, there were no reported crashes at the three roundabout intersections.

Aerial image of the Lee Road roundabouts at US-23 in Livingston County, MI

Image courtesy of Aerial Imaging Solutions

Myth #9: Modern roundabouts should be used everywhere

This is false. Modern roundabouts are not appropriate at every intersection, nor are they a "magic bullet" to cure all existing problems an intersection may be experiencing. In some instances, signalized intersections are more appropriate, especially in heavily signalized urban corridors where traffic signal progression is used to move platoons of vehicles.

As stated within Myth #3, a comparative alternative analysis should be performed when a road agency or body of government is considering an intersection improvement project to determine what needs and objectives are provided with each alternative while also determining the preliminary estimated construction and right-of-way costs.