

# ROUNDAABOUTS

“The safest, most efficient and attractive form of traffic control in the world.”



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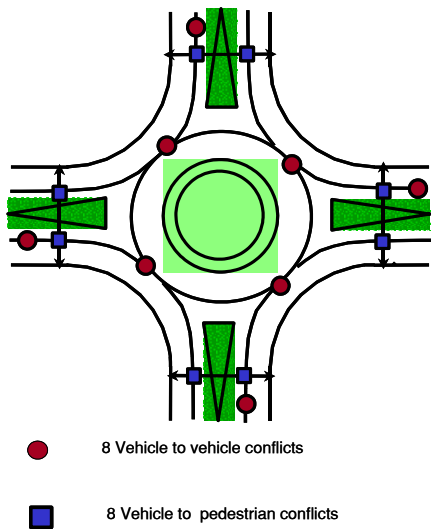
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# Overview of Modern Roundabouts

## Introduction

Modern roundabouts are the prettiest and safest form of traffic control in the world. Roundabouts slow all vehicles, provide refuges for pedestrians, and are the only traffic control device in which trees can be planted, fountains can bubble or spray, statues can sparkle into the next century. When constructed as part of new road construction they are cheaper to build than signalized intersections. If used instead of traffic signals they save us all money. Their maintenance cost is almost zero. They require no electricity, no regular tune-ups, and no annual replacements of parts, suffer no blackouts and cannot be blown away.

Modern roundabouts are not the old fashion traffic circles of yesteryear, those large circles about which people tell tales of getting lost, praying that they will survive to the other side each time they drive through the traffic circle. These feelings developed because drivers who entered a traffic circle often could not see their exit point. Therefore, because they traveled had to travel a long distance they become "lost," or ran out of gas. In addition, the design of traffic circles was based on high-speed entry, a high-speed merge followed by a high-speed exit. The high speed maneuvers intimidated many drivers, yet they continued to drive through them. If they were so bad why did they continue to drive through them and are here to tell the stories?



Roundabouts are the complete opposite of traffic circles. Roundabouts are usually designed as small as possible for their environment. When designing a roundabout the

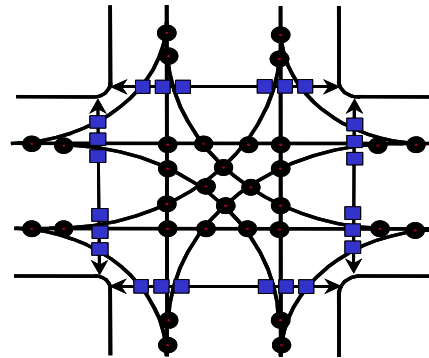
most an important criterion is design speed. Depending on the environment and the design objectives the design speed can vary from 12 mph in residential streets, 15 to 18 mph on collector streets and 18 to 23 mph on arterial roads. At high-speed rural roundabouts 25 mph is the maximum design speed that should be used. Design speeds above these levels will provide a higher crash rate.



**Figure 1**

Overview of Clearwater Beach roundabout carries 1.2 million vehicles and 150,000 pedestrians per month.

## Crash Reduction



- 32 Vehicle to vehicle conflicts
- 24 Vehicle to pedestrian conflicts

There are two basic premises on which roundabouts achieve crash reductions of 50 to 90 percent when compared to two and four-way stop control and signalized intersections and greatly reduced severity on those few crashes that do occur.

One is the simple decision making combined with the low level of conflicts. At a four-way intersection there are 32 possible conflict points between vehicles and only eight at roundabouts. Pedestrians face six conflicts when crossing only one leg of the road whereas at a roundabout they only have two as shown above in the conflict diagrams.





**Figure 2**

Roundabout at Montpelier, VT on a state highway only a few hundred feet from an elementary school

More specific crash data comes from the FHWA and the Insurance Institute for Highway Safety. Studies from both organizations found that roundabouts reduce crashes, fatal and injury crashes by 90 percent, injury crashes by 73 percent and all crashes by 39 percent. Yet so many people think roundabouts are crashes waiting to happen. The first roundabout on a State Highway in the US was in Montpelier, VT. It opened 5.8 years ago. The crash rate before the roundabout was approximately 5.5 crashes per year. The after crash rate, shows no reported crashes.

At the large two lane roundabout in Clearwater beach many minor property crashes have occurred most of which would never be reported because they would be under the dollar limit. Most of these crashes were caused by incorrect education and a failure to yield at one point, and only one point, on a six-legged roundabout. Prior to the roundabout there were approximately 35 reported crashes per year. Many of them were injury crashes. There have been no pedestrian bicycle crashes in the first 20 months despite an average of 4 a year prior to the roundabout.

A two-lane/one lane roundabout in South Carolina carries approximately 2,500 vehicles per hour. In the 36 months before the roundabout there were 48 crashes with 15 injury crashes. In the 48 months afterwards there were 9 minor property damage only crashes. These crashes were mainly the lane change crashes that occur when drivers illegally change lanes.

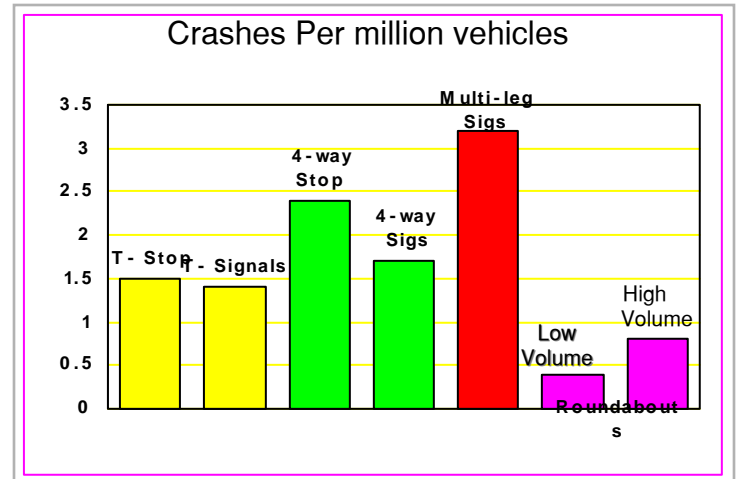
Secondly, the low speed means that if a driver makes a mistake it is easy to stop at a low speed or at least the impact is relatively minor. Whereas signalized intersections have high-speed right angle and left turn crashes, and many others, crashes at roundabouts are primarily rear end or low speed merge crashes. It is very, very hard to be killed at a roundabout whereas a driver

running a red light can easily kill themselves and others.



**Figure 3**

Two-lane roundabout in Hilton Head roundabout with the large crash reduction



**Figure 4**

Comparative crash rates for roundabout versus stop and traffic signal control

Consider this comparison. In 1999 according to the FHWA drivers who ran red signals caused 85,000 crashes, in which 81,000 people were injured and 1,100 people were killed.

## Roundabout Design

A roundabout consists of a central island that can vary in shape from a "square-a-bout" in Victorian areas, ovals and ellipses at odd shaped intersections to the ordinary

circle. Each leg of a roundabout has a splitter island, a triangular shaped island, that provides a refuge for pedestrians, prevents drivers from making the "wrong-way" left turn, guides drivers through the roundabout by directing them to the edge of the central island and helps to slow drivers.

Local street roundabouts are quite small. The central island starts at about 15 feet in diameter. Collector road roundabouts start with around a central island diameter of 30 to 40 feet. Roundabouts on arterial roads start with a minimum central island diameter of 64 feet for a single lane roundabout. Even large roundabouts at freeway interchanges or major intersections have central island diameters that are only 120 to 180 feet.

## Uses

Modern roundabouts can be used at a wide variety of intersections - Freeway interchanges, Tee intersections, four-way or "Y" type intersections. Multi-leg intersections up to eight roads are an especially effective location for roundabouts. Any intersection with more than four legs will operate safer and far more efficiently than the same intersection with traffic signals. Trains or light rail vehicles can travel through the middle of a roundabout. When trains pass through a roundabout only two boom gates are required to stop the traffic. Both gates are placed next to the train tracks to stop the circulating traffic. When the trains come the boom gates stop the traffic, then, depending on the courtesy of drivers, the roundabout may be blocked. When the boom gates open it only takes less than a minute or so to clear the traffic. When Light Rail Vehicles pass through the center of a roundabout they do so without any assistance whatsoever and they have absolute right-of-way. Do vehicles run into these larger vehicles? No. It is hard to run into an 80 foot long Light Rail Vehicles at 20 mph.



**Figure 5**

Roundabout in Jensen Beach, Florida with the FEC freight line running through the center of the roundabout.



**Figure 6**

Opposite views of the six-leg roundabout in Jensen Beach, FL, at the entrance to their Main Street with the Florida East Coast Railroad through its center.

## Roundabouts and Access Management

Modern roundabouts also simplify Access Management in two ways. By replacing Center Turn Lanes with a raised median some drivers must pass their destination and make a U-turn to access their destination. Roundabouts make U-turns very safe and provide an opportunity to sell medians to business owners. The other benefit is at an intersection where a roundabout is constructed and there are driveways to private houses or commercial properties that are at or close to the intersection. Rather than but them out, or pay a compensation for moving their driveway, provide a driveway into the roundabout. There are a few caveats. Firstly every vehicle must drive into the roundabout, no reversing is permitted. In the case of a private house a turn around may be needed in their front yard. Secondly, there must be separation between the entry and exit points to the roundabout and the driveway. There is a two-lane roundabout in Spartanburg, SC, that has four roads, two frontage roads, on and off ramps, and five driveways accessing the roundabout.

## Traffic Calming

Roundabouts are the most effective traffic calming treatment available. They limit vehicle speeds to and control vehicle speeds on four streets simultaneously. Gateways to communities and main streets are an effective location for roundabouts to slow traffic and create a grand entrance. They can act as a town square with fountains to create a focal point, a place to be. In addition to the beauty they slow traffic and assist pedestrians to cross the street.





**Figure 7**

A traffic calming roundabout in Elgin, Illinois where the roller blade rider is traveling as fast as the car.



**Figure 8**

Another multi-purpose roundabout in Fort Pierce, FL; to control vehicle speed control within a neighborhood at an awkward, off-center intersection. Improved aesthetics was also a major goal.

## Resistance

Yet there is resistance to roundabouts based often on poor experiences with old traffic circles, a reluctance to try something new, to change, or a fear that at they will not work in America. However they are a rapidly growing awareness that roundabouts will solve many traffic problems, enhance cities etc. that they have now been constructed in more than 40 states, ten Departments of Transportation. Each roundabout has been an outstanding success. Americans have shown that their adaptability and competence have exceeded that of the detractors. Whether the roundabouts are constructed at freeway interchanges, at high-speed rural intersections, with light rail running through the middle, next to schools, within senior communities, to calm traffic, everyone that was properly designed has exceeded expectations. Several badly designed roundabouts have been removed and several have been modified.

Unfortunately, many old traffic signals have been cut up unnecessarily by roads being cut through their center and traffic signals installed. As a result, the aesthetics of the circles suffered when, in many cases, converting them to modern roundabouts by changing their entry conditions could have reduced crashes, improved capacity, and retained the aesthetic value of the circle.

## Aesthetics

Roundabouts are the only form of traffic control whose design is as much an art form as it is science. Their design involves an interaction between design speed templates, curves that provide drivers with a smooth path and pleasing appearance. The splitter islands (triangular islands on each approach) must be large enough to provide safe refuge for pedestrians back from the entry point. Instead of using plain concrete for the center and splitter islands, we need to use a mix of pavers and low shrubbery or grass, with trees, fountains, or statues in the center island to give a unified look from right-of-way line to right-of-way line. Therefore, landscape architects and engineers should work together to give communities traffic control that is safe and effective and meets their needs while enhancing the intersection and larger surrounding area or a town center.

Modern roundabouts work by making drivers move to their right as they enter the roundabout, go left as they pass around the center island, and then go right as they exit. The degree of curvature through the roundabout is what governs the vehicle speed. The tighter the curves the lower the speed.

## Summary

Modern roundabouts are the safest and prettiest form of traffic control in the world that can also achieve many other communities objectives such as traffic calming, cost savings, act as gateways and town centers. All in all they are the most versatile and fastest growing form of traffic control in this country.



**Figure 9**  
An overview of the Clearwater Beach Roundabout



**Figure 12**  
Cover Photograph  
A beautiful roundabout at the entrance to an upscale shopping mall in Coral Gables. Roundabout is located on a four lane road at a six leg intersection carrying approximately 2,000 vehicles per hour.



**Figure 10**  
Tight Freeway Interchange in Newton , KS



**Figure 13**  
A new two lane roundabout in Viera, Florida. Note the size of tree that was moved to create the centerpiece.



**Figure 11**  
Twin roundabout only 600 feet apart on A1A in north Florida in a 45/55 mph zone.

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