Roundabouts and the Multi Modal Roadway Network of the Future

The vision of a multimodal transportation network requires the integration of all of the various modes of transportation.

Interchange Designs Incorporating Roundabouts

A well-designed roundabout requires motorists to slow when negotiating the roadway. Because of this, roundabouts can serve as a method to alert roadway users that they are transitioning from one roadway environment to another, such as from the freeway to the local street system, or from a rural environment to one that is more urban.

The modern roundabout can be used in a variety of urban and rural settings and with a variety of configurations ranging from mini-roundabouts to large multilane roundabouts and interchange ramp terminals. Motorists and transportation professionals alike are realizing the broad potential application and benefit to considering roundabouts along with traditional intersection designs.

As roundabouts do not use traffic signals to control the entry, they do not require a constant power supply. This means that a roundabout can continue to function during power failures. Also, roundabouts do not require the installation or maintenance of the traffic detection devices associated with traffic signals.

Presented By: w-trans TRB TRANSPORTATION RESEARCH BOARD OF THE NATIONAL ACADEMIES

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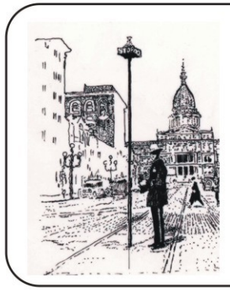
Roundabouts in the United States

Many people in the United States are unfamiliar with roundabouts. Today, however, there is a growing volume of information on roundabouts that demonstrate how they have proven to be a safe and effective form of intersection design.

Traffic Management and Intersection Control: A Historical Perspective



Sometime in the early 1800's traffic management became an issue as urban populations gained in density. Pedestrian and horse traffic became such a problem in 18th century London that systems of traffic control devices began to appear, including colored lanterns and semaphore flags.

By the beginning of the 20th century the widespread usage of the automobile increased the need for safe traffic control as the increasing speed of traffic escalated safety issues regarding vehicle collisions and pedestrian safety.

Roundabouts and Other forms of Circular Intersection Design

The modern roundabout has three distinguishing characteristics: They are generally circular in shape, they have geometric features to slow traffic passing through the intersection, and they are always yield-controlled for the motorist entering the roundabout.

The Modern Roundabout

The other forms of circular intersections serve different purposes. The rotary is usually larger and serves a wider geographic function, with parking or other features occupying the center island. The large traffic circle likewise functions as more of a circular confluence of streets, often allowing and encouraging pedestrians to access the center of the circle. The neighborhood traffic circle is a much smaller design usually placed in the center of an intersection, narrowing the available travel lanes in an effort to slow the traffic traveling through the neighborhood. None of these is, by intent or by design, a modern roundabout.

Safety Benefits of Roundabouts

Research has shown there are many safety benefits associated with roundabouts.

As a school crossing guard from Wisconsin stated. "Personally, I love them, . . . you only have to stop one lane of traffic, then go to the middle and wait. The cars can't go much faster than 20 mph through the roundabout so the crossing aspect is great"

Research shows that roundabouts can be an effective way to improve safety at intersections. When comparing data from roundabouts that were converted from four-way intersections, the reduction in crash rate is quite remarkable. A review of 55 sites where various traditional intersections were converted to roundabouts, before and after crash data shows that a total of 1122 crashes per year were reduced to 726 total crashes per year, a reduction of 35 percent.

Bicycle Safety Benefits

Bicycles travel as vehicle

Bicycles travel as pedestrian

In 2003, there were an average of 6,850 motor vehicle crashes per day at intersections across the United States. This means there were over two and a half million intersection related crashes in that year. Data from the Insurance Institute for Highway Safety shows that the intersection-related crashes represent 41 percent of the total motor vehicle crashes that occur on the roadway system, 46 percent of all injury crashes and 23 percent of all fatal crashes in this country.

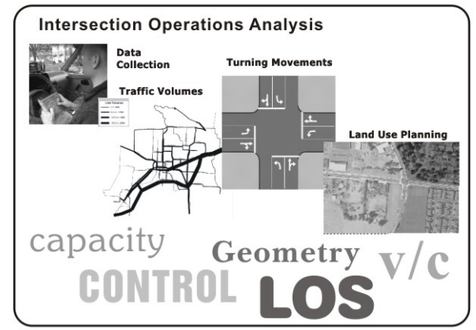
Safety Data

While crashes do occur at roundabouts, the research has shown that with the one exception of an all-way stop controlled intersection, there is a significant reduction in the overall number of crashes where roundabouts replace conventional intersections. More importantly, the number of severe injury related crashes was reduced significantly, in some cases, a reduction of 60 to 80 percent.

Intersection Type	Change in Total Crashes after Conversion	Change in Severe Injury after Conversion
All IIntersections	-35%	-76%
Signalized Urban	TOO FEW	-60%
Signalized Suburban	-67%	TOO FEW
All-Way Stop Controlled	SIMILAR	SIMILAR
Two-Way Stop Controlled Urban	-72%	-87%
Two-Way Stop Controlled Suburban	-32%	-71%
Two-Way Stop Controlled Rural	-29%	-81%

Roundabouts and Intersection Operations

In order to understand how transportation professionals determine if installing a roundabout is a suitable solution for a specific intersection, it is important to be aware of some of the roundabout's operational considerations.

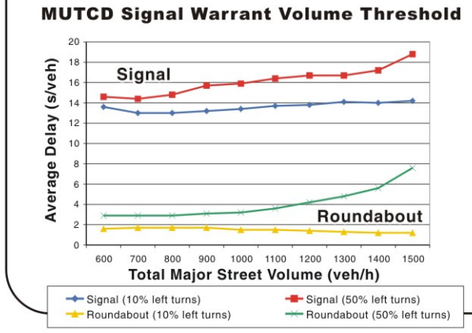


The roundabout design and yield signs allow each motorist to enter the roundabout with a minimum delay by yielding to the vehicles to the left and then proceeding to the desired destination.

A wide range of costly technology is required to achieve a coordinated traffic signal system on a roadway. These systems grow more complex as intersections serve increasing volumes of motorized and non-motorized traffic. Many signal systems today can be monitored and controlled from a central location.

Signal systems are expensive to install and maintain and can result in an expensive energy bill, as the signals are required to operate continuously.

MUTCD Signal Warrant Volume Threshold



A roundabout typically experiences significantly less delay than a signalized intersection serving comparable traffic volumes. This example shows that motorists experience an average of approximately 14 seconds of delay at a signalized intersection as compared to less than two seconds of delay at a roundabout with similar turning volumes.

The combination of geometric and self-regulated yield control represents a simple, low-cost alternative to a traffic signal.

Based on MUTCD Warrant 3 (2000 ed.) Warrant 11 (1988 ed.)

Roundabouts: How They Are Used

Special publications, videos and instructional materials about roundabouts are available to provide guidance to the road users as their use becomes more widespread across the country. Public service TV announcements can provide a great opportunity to show film clips that describe the rules of the road as it relates to roundabouts. This can also include examples and guidance for motorists, cyclists and pedestrians. An increasing number of State Driver's Manuals include criteria and rules of the road related to roundabouts.

Special Publications