U.S. Department of Transportation
Federal Highway Administration

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Priority, Market-Ready Technologies and Innovations

SAFETY & DESIGN

Roundabouts

Problem: Intersection crashes account for more than 45 percent of all crashes nationwide

Intersection safety is a serious problem in the United States. Addressing this problem is one of the Federal Highway Administration's (FHWA) top priorities.

In 2004, more than 2.7 million intersection-related crashes occurred, accounting for more than 45 percent of all crashes in the United States. That same year, intersection fatalities were 9,117 or 21 percent of all traffic fatalities.

In addition, approximately 45 percent of all injury crashes, or nearly 900,000 crashes, occurred at intersections. Each year, side-impact crashes, which occur mostly at intersections, cause more than one-third of all vehicle occupant deaths.

Why are there so many intersection crashes?
An intersection is a planned point of conflict in the roadway system. With different crossing and entering movements by both drivers and pedestrians, an intersection is one of the most complex traffic situations that motorists encounter. Add the element of speeding motorists who disregard traffic controls, and the dangers are compounded.

Who is most likely to be affected?
Situations involving complex speed-distance judgments under time constraints, as found at intersections, can be problematic for many drivers and pedestrians, especially senior drivers and pedestrians. Approximately half of fatal crashes involving drivers 80 or older take place at intersections.

Solution: Roundabouts are a proven safety solution that prevent and reduce the severity of intersection crashes

Over the past 25 years, U.S. intersection designs and traffic engineering measures have improved, but the annual number of intersection fatalities has not changed significantly. To reduce crashes and improve intersection safety, FHWA recommends the use of roundabouts, where appropriate. Roundabouts must be designed to meet the needs of all road users—drivers, pedestrians, pedestrians with disabilities, and bicyclists. Proper site selection and pedestrian channelization are essential to making roundabouts accessible to all users.

What is a roundabout and how does its design improve intersection safety?
A roundabout is a one-way, circular intersection in which traffic flows around a center island. Roundabouts are designed to meet the needs of all road users—drivers, pedestrians, pedestrians with disabilities, and bicyclists. A roundabout eliminates some of the conflicting traffic, such

Putting It in Perspective

In 2004:

- Approximately 1 intersection-related fatality occurred every hour.
- Approximately 2 intersection-related injury crashes occurred every minute.
- Financial loss from intersection crashes was $96 billion.

as left turns, which cause crashes at traditional intersections. Because roundabout traffic enters or exits only through right turns, the occurrence of severe crashes is substantially reduced. Small-angle collisions that may occur as a result of a right-hand turn are typically less severe than other types of collisions.

Not all circular intersections are roundabouts. Many existing traffic circles or rotaries operate under different traffic rules and have experienced operational and safety problems.

The three safety design features of a roundabout are yield control of entering traffic; channelized approaches that deflect traffic into the proper one-way, counterclockwise flow; and geometric curvature of the circular road and angles of entry to slow the speed of vehicles. These three features are critical to the success of a roundabout because they effectively decrease driving speed to typically 48 kilometers (30 miles) per hour or less.

Benefits

- Crashes are less severe than other intersection crashes.
- Safer than traditional intersections.
- Cost-effective way to improve intersection safety.
- Increased traffic capacity and improved traffic flow.
- No signal equipment to maintain.
- Aesthetic benefits.

Successful Applications: There are increasing numbers of examples of roundabouts demonstrating success in reducing crashes

A 2000 study by the Insurance Institute for Highway Safety and several other organizations evaluated 24 intersections in California, Colorado, Florida, Kansas, Maine, Maryland, South Carolina, and Vermont before and after construction of roundabouts. The study revealed a 39-percent decrease in crashes, a 76-percent decrease in injury crashes, and a 90-percent reduction in crashes involving fatal or incapacitating injuries.

A December 2002 study of 15 single-lane roundabouts in Maryland showed a 60-percent decrease in total crash rates, an 82-percent reduction in injury crash rates, a 100-percent decrease in the fatal crash rate, and a 27-percent reduction in property-damage-only (PDO) crash rates. In addition, a soon-to-be-published study by the National Cooperative Highway Research Program found that the installation of roundabouts led to a 35-percent reduction in total crashes and a 76-percent reduction in crashes causing injuries or fatalities.

These are but a few examples of the safety benefits of roundabouts. There also are operational benefits from roundabouts, such as less delay and increased traffic capacity.

Deployment Statement

Building more well-designed roundabouts will result in fewer crashes and less delay than stop- and signal-controlled intersections.

Deployment Goal

A desirable goal would be to build approximately 1,000 roundabouts per year. To help accomplish this, the Safety and Design Technical Service Team at the FHWA Resource Center offers a 1-day workshop on roundabout safety and design. The workshop was developed in conjunction with the FHWA publication, *Roundabouts: An Informational Guide* (FHWA-RD-00-067). The Technical Service Team also offers a promotional video, titled "The Case for Roundabouts," and a color brochure explaining the benefits of roundabouts.

Deployment Status

Approximately 150 to 250 roundabouts are built in the United States each year.

Additional Resources

FHWA has published a comprehensive guide called *Roundabouts: An Informational Guide* (FHWA-RD-00-067). To order a copy of the guide, send a request to report.center@fhwa.dot.gov or visit **http://www.tfhrc.gov/safety/00068.htm**.

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