

Roundabouts Save Lives, Money and Fuel

By Randy Rodgers Executive Editor | Posted: Wednesday, November 9, 2011 6:03 pm

Most municipalities love to save money and reduce greenhouse gas emissions. But when it comes to road design and traffic management, nothing trumps the saving of lives.

Bring on the era of roundabouts!

A roundabout saves money and natural resources because it allows traffic to flow slowly through an intersection with very little queuing. As a result, vehicles don't sit and idle as much, traffic congestion is diminished, electronic signaling is minimal or non-existent, and it isn't necessary to increase the number or length of lanes leading up to an intersection.

But, the most important advantage to roundabouts isn't economic. Roundabouts save lives because they prevent vehicles from speeding through intersections and causing the deadliest and most common type of crash in an urban setting. When roundabouts replace traditional signaled intersections, studies show crashes at those intersections are reduced by 76 percent and deaths by 90 percent.

"Intersections are bad," said Evan Pratt, P.E., senior associate at Spicer Group of Ann Arbor, Mich. "In fact, they're the most dangerous public facility in America. In 2009, 650 people died each week on roads. That's the same as three plane crashes. What do you think you'd see in USA Today if there were three plane crashes in one week? Do you think people would freak out? You need to get your city council to freak out about all the people who are dying on roads today," Pratt told an audience of public works professionals at the recent American Public Works Association's International Public Works Congress and Exposition in Denver, Colo.

Pratt said 25 percent of all traffic fatalities and almost half of all injuries happen at intersections, which give intersections a vastly disproportionate share of traffic casualties, given they account for less than two percent of roadway surfaces in the U.S.

"There are long-term healthcare legacy costs that come out of all of these accidents at intersections," Pratt said. "These are the T-bones; these are the head-on crashes that you often see at intersections."

Given these statistics, the financial savings gained by roundabouts and other alternative intersection designs are almost an afterthought.

"They will last longer, they'll function better 20 years from now than a traditional stop-controlled or signalized intersection, and they'll probably eat up less of your resources over that time. In fact 'probably' is the wrong word," Pratt said.

Mike McBride, city engineer for Carmel, Ind., said his community has been developing

roundabouts since 1997, shortly after long-time mayor Jim Brainard first began promoting the concept, which he saw working in England and several U.S. cities at the time. Since then, Carmel's population has grown from 38,000 to 80,000. It now has 67 roundabouts and another 16 in the design stage. In the past eight years, the city has invested more than \$500 million into transportation infrastructure, and while its road miles have increased from 220 in 2003 to 395 in 2008, its ratio of injury accidents per road mile decreased 51 percent.

McBride credits the roundabouts, which have reduced the number of signalized intersections in the city to only 39. In a citywide study, accidents at all intersections resulted in injury 29 percent of the time, while only four percent of accidents at single-lane roundabouts and seven percent at dual-lane roundabouts resulted in injuries. The average cost of an accident at a roundabout was \$2,500 versus \$10,500 at signalized intersections. Between 2002 and 2006, Carmel's total cost per accident declined by \$3,000.

"So, we basically incorporated a plan that – unless we could figure out why not – we were going to put roundabouts at our intersections," McBride said. The city began installing roundabouts at a rate of eight per year, he said.

William Hange, Jr., traffic engineer for the city of Loveland, Colo., said his city had a bad experience with a "non-conforming traffic circle" that many long-time residents remember as the city's first roundabout built in the 1940s. Because the traffic circle was not designed with the traffic-calming features of today's roundabouts, vehicles were able to travel around the circle at high rates of speed, which resulted in several serious accidents.

It was almost 50 years later before Loveland built its first true roundabout. Hange said that roundabout, built in 1998, was the scene of only one injury accident by 2005. Traffic data at the time indicated the city's first roundabout prevented an estimated 65 accidents, nine that would have caused injuries.

The city now has 20 modern roundabouts, including several at interchanges that had experienced long queue times as wide roads bottlenecked into narrow intersection nodes. The "wide nodes, narrow roads" concept of roundabouts dramatically reduced wait times and allowed the city to avoid adding more lanes to handle increasing traffic loads at the interchange.

Steve Weinberger, traffic engineer and principal at W-Trans in the Oakland, Calif., area said the U.S. is in the middle of a 20-year transition period in which the driving public is learning to get used to roundabouts.

"Even the design community is still getting up to speed on roundabouts," Weinberger told a group of municipal leaders at the League of California Cities Annual Conference and Expo, held recently in San Francisco. "At last count, there are about 150 to 200

roundabouts at intersections in California," he said.

Just as happened in Loveland, Weinberger said people often confuse traffic circles for true roundabouts. Small traffic circles in residential areas slow traffic down, but don't provide the capacity needed for merging lanes of heavy traffic, he said, while large traffic circles, or rotaries, don't slow traffic enough to provide the safety advantages of roundabouts.

Modern single-lane roundabouts have a diameter of 90 to 120 feet, Weinberger said. Pedestrians typically cross at "splitter islands" positioned behind traffic that is waiting to enter the circle, rather than in front of it. Vehicles entering the interior circle approach at an angle and must yield to vehicles inside the circle. The inner circle typically has a truck apron that allows the rear wheels of trucks to make the wide turn, but discourages cars from using the space to increase their speed around the circle, he said.

All the angles and curves in a roundabout are designed very specifically to keep traffic flowing steadily in the 15 to 20 mph range, Weinberger said. At the same time, roundabouts are designed to increase capacity, resulting in significantly shorter delays and fewer stops per lane than signalized intersections.

"At most volumes, given the same amount of pavement and travel lanes, a roundabout can do better than a traffic signal," Weinberger said. "At low volumes, most traffic entering a roundabout will have no delay. They'll enter and move on, where you'll always have delays at a traffic signal." That, he said, is why roundabouts save energy. Fewer stops and less idling equals reduced emissions and fuel consumption.

The safety advantages, he said, are achieved by the slower speeds along with fewer "conflict points" than typical intersections. Weinberger referred to a diagram that showed a traditional intersection with 32 vehicle-to-vehicle conflict points and 24 vehicle-to-pedestrian conflict points, while a standard modern roundabout has only eight conflict points for vehicles and eight for pedestrians. He said studies of intersections that have been converted to roundabouts showed a 35-percent decrease in crashes and a 76-percent decline in injuries.

Pedestrians have the advantage of crossing a shorter distance to a center island, against traffic that is moving in a single direction. Because of the slower speeds, bicyclists can either "claim the lane" and progress through the intersection just as a car would, or they can walk their bikes across the pedestrian crossings.

Roundabout applications have included transition areas between residential and commercial zones; corridor operations; freeway interchanges; and those odd intersections where multiple routes converge at peculiar angles. They are also used effectively in downtown districts with lots of vehicle, pedestrian, bicycle and mass transit traffic.

Fritz McKinley, P.E., building and development services director in Chico, Calif., said he learned "there really is no cookie cutter" for roundabouts. He said the location of the

intersection and the type of users it serves must be considered when deciding if a roundabout is appropriate and, if so, how it is designed.

"We learned we had to consider the equestrians and the oversized truck loads, and that was something we didn't catch early on," McKinley said. "Getting people involved early is highly recommended."

He said Chico now solicits comments from all stakeholders before introducing a roundabout to a neighborhood, and it has produced brochures and public service announcements that show people how to use a roundabout. "Communication is a two-way street, you have to give it and you have to get it from people," he said.

Interdepartmental communication is also important. Chico built a roundabout right in front of its fire station, with the full participation of its emergency personnel.

"During rush hour they are quicker and safer than most controlled intersections during an emergency response," Berry said, because traffic is backed up less, there is no cross traffic and there's no need to go against traffic to get the fire trucks through.