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Roundabouts Brochure

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ROUNDABOUTS

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Description

Traffic signals and stop signs at intersections are inherent sources of delay because they stop one direction of traffic to permit a conflicting movement to proceed. The modern roundabout is designed to counteract those sources of delay with yield control of entering traffic, splitter islands on the approaches, and appropriate roadway curvature to reduce vehicle speeds on each approach. As a result, all vehicles slow to enter and traverse the roundabout but do not need to stop unless waiting on a gap in traffic in the circulating roadway. Thus, while lower speeds are prevalent, more vehicles can be served and capacity is increased. In addition, the approach angles at entry are much lower than the typical 90 degrees found at traditional intersections, which, combined with the lower speeds, leads to substantial reductions in the number of crashes and related injuries, and the crashes that do occur are generally of much lower severity.

Intersection User Groups

The primary user group for modern roundabouts usually consists of drivers of passenger vehicles. In urbanized areas, these drivers are frequently local and their trips often begin or end in or near the neighborhood or area where the roundabout is located. In suburban and rural locations, these drivers are typically traveling longer distances and the roundabout is just one intersection in a lengthier trip. Drivers of heavy vehicles also commonly use suburban and rural roundabouts; these vehicles may cover a wide range of configurations from buses and single-unit trucks to semitrailers and even oversize/overweight vehicles. Drivers of emergency vehicles such as fire trucks also comprise a potential user group in urban, suburban, and rural settings. The characteristics of these larger vehicles require additional considerations in the design of the intersection and approaches compared to passenger vehicles. In addition to drivers of motor vehicles, pedestrians and cyclists are commonly found at roundabouts in urban and suburban areas. Provisions for those pedestrians and cyclists to traverse the roundabout and cross the roundabout approach legs must be included in the intersection design. Recent research provides suggestions on how to accommodate pedestrians and bicyclists at roundabouts (see For More Information below).

Benefits

- Reduced delay and fuel use and improved capacity by eliminating unnecessary stops.
- Improved efficiency by increasing the motor vehicle capacity of the intersection.
- Increased safety by reducing conflict points and eliminating right-angle and head-on crashes.
- Reduced maintenance costs by eliminating traffic signals.

Design/Implementation Considerations

Right of way, proper geometric design principles to encourage low speeds, and education of road users are key to the success of a modern roundabout intersection. Key design features in a modern roundabout

include splitter islands on each approach to separate and slow entering traffic, a truck apron in the circulatory roadway adjacent to the central island to accommodate wheel tracking for large vehicles, and a clearly marked entrance line. The inscribed circle diameter (ICD) of the outer edge of the circulatory roadway should be properly sized for the design vehicle; rural roundabouts that serve heavy vehicles have typical ICDs up to 180 ft, while urban and suburban roundabouts are smaller. The approach alignment must provide a good view of the splitter island, the central island, and, preferably, the circulating roadway; the alignment must also provide adequate sight distance for passenger car drivers to notice an acceptable gap of 4 to 5 seconds for detecting potential conflicting movements with vehicles entering from the approach immediately to the left and vehicles traveling in the circulating lanes. Speed reduction on the approaches is typically accomplished through design, though pavement markings, signs, beacons, and roadway lighting can supplement the features of the design.

Source: NCHRP Report 672

Success Stories…

- A roundabout in Daingerfield, Texas successfully accommodated the movements of a four-leg intersection (Coffey Street at Jefferson Street) with an overlapping railroad crossing.
- A Kansas rural roundabout with 4,800 ADT and 50 percent heavy vehicles showed a 16-to-1 decline in crashes compared to previous two-way stop control (Tobaben and Church).

For More Information

Guidelines for designing roundabouts, information on recent research, and other resources can be found in the following:

- Brewer, M.A., K. Fitzpatrick, M. Shirinzad, H. Zhou, D. Florence, J. Tydlacka, B. Dadashova, and M. Le. *Research and Findings on Roundabouts and Innovative Intersections for High-Speed and Rural Locations.* Report No. FHWA/TX-22/0-7036-R1. Texas A&M Transportation Institute. College Station, TX. 2022.
- Rodegerdts, L., J. Bansen, C. Tiesler, J. Knudsen, E. Myers, M. Johnson, M. Moule, B. Persaud, C. Lyon, S. Hallmark, H. Isebrands, R.B. Crown, B. Guichet, and A. O'Brien. *Roundabouts: An Informational Guide—Second Edition.* NCHRP Report 672. National Cooperative Highway Research Program, Transportation Research Board. Washington, DC. 2010.
- Blackburn, L., M. Dunn, R. Martinson, P. Robie, K. O'Reilly. *Improving Intersections for Pedestrians and Bicyclists Informational Guide*. Report No. FHWA-SA-22-017. Available at: https://safety.fhwa.dot.gov/intersection/about/fhwasa22017.pdf. 2022.
- Fact Sheets: FHWA Improving Intersections for Pedestrians and Bicyclists. Available at: https://safety.fhwa.dot.gov/intersection/about/fhwasa22041.pdf. 2022.
- Tobaben, J. and D. Church. Design, Operations, and Safety of High Speed Approach Rural Roundabouts. WSP Parsons Brinckerhoff. March 9, 2016.

Texas Department of Transportation