Speed Management Toolbox for Rural, Urban, and Suburban Facilities

Countermeasures for Speed Management at Intersections and Pedestrian Crossings

ROUNDABOUTS

When designed correctly, a roundabout requires drivers to physically adjust their driving path to negotiate the feature (Figure 1). Speed reduction is accomplished through geometric design in conjunction with traffic control devices to communicate the appropriate speed to drivers (Miner 2022).

The Insurance Institute for Highway Safety (IIHS) recommends the use of roundabout design features that encourage drivers to decrease their speed in order to optimize traffic safety (e.g., adequate approach road curvature and alignment with the center island) (Brewer et al. 2017).

Roundabout features such as speed limit and other advance warning signs ensure that drivers are aware of the roundabout. Additionally, the use of center island landscaping can promote lower speeds and focus driver attention on the roundabout.

Image source: Iowa DOT

Figure 1. Roundabout

Considerations for Implementation

Roundabouts have been used in a number of settings, both urban and rural, and have been used for single-lane and multilane roadways. Since roundabouts are a design feature, it is recommended that readers consult one of the several roundabout guidance documents provided in the Other Resources section of this summary.

Implementation considerations for different road users and roadway types are summarized in Tables 1 and 2.

Table 1. Implementation considerations for different road users

User Group	Considerations
	No concerns
	No concerns
	Ensure that crossing locations are accessible
	Ensure that the presence of the roundabout is marked to allow motorcycles to adjust their path
	May need to provide an educational campaign for unfamiliar users
	No concerns if these users are considered in design
	Consider the ability of these users to negotiate around traffic to quickly enter/exit a roundabout
	May be difficult for these users to navigate; may need to provide an educational campaign for unfamiliar users

Table 2. Implementation considerations for different roadway types

Roadway Type	Considerations
Urban	• Appropriate for most situations • Consider high bicycle or pedestrian volumes
Suburban collector	• Appropriate for most situations
Suburban arterial	• Appropriate for most situations
School zone	• Depends on roadway characteristics • Consider crossing locations
High to low speed transition	• Consider high-speed approaches
Rural high-speed arterial	• Consider high-speed approaches • Consider the presence of farm vehicles, horse-drawn buggies
Rural curve	• May be challenging within a horizontal curve
Rural village	• Consider roadway characteristics • Consider the presence of farm vehicles, horse-drawn buggies
Rural unpaved	• Use of roundabouts not feasible on unpaved roads

Effectiveness

Crash Reduction

Crash reduction factors (CRFs) and crash modification factors (CMFs) for roundabouts are summarized in Table 3.

Table 3. Crash reduction factors for roundabouts

Iowa DOT Planning-Level Guidance or Iowa-Specific Studies	National Studies
• Install roundabout at urban unsignalized intersection: ✓ CRF = 45 (all crashes) ✓ CRF = 75 (fatal + injury) • Install roundabout at urban signalized intersection: ✓ CRF = 20 (all crashes) ✓ CRF = 65 (fatal + injury) • Install roundabout at rural unsignalized intersection: ✓ CRF = 65 (all crashes) ✓ CRF = 85 (fatal + injury)	The CMF Clearinghouse (https://cmfclearinghouse.fhwa.dot.gov/) has over 340 CMFs for various roundabout scenarios (e.g., converting a rural stop-controlled intersection to a high-speed roundabout). Due to the large number of CMFs for roundabouts, the CMF Clearinghouse should be consulted directly for specific situations.

Speed Reduction

Most studies on the effectiveness of roundabouts have focused on crash reduction rather than speed reduction. As a result, no studies were found that quantify the impact of roundabouts on speed.

Examples of Applications

Roundabouts have been widely used in Iowa. The Iowa DOT maintains a list of locations where roundabouts have been installed, along with the type of intersection configuration that the roundabout replaced (Iowa DOT n.d.).

Opportunities

The main advantages of roundabouts include the following:

- Reduce speed by physically changing vehicle paths
- Reduce intersection conflict points
- Allow pedestrians to cross one direction of traffic at a time
- Change the angle of a crash when one occurs

Challenges

The main disadvantages of roundabouts include the following:

- May require additional education for unfamiliar users to negotiate, including yielding and turning
- Cost more than many countermeasures but are similar to the reconstruction of an intersection with multiple turn lanes
- May require additional design to accommodate some vehicle types (e.g., farm equipment)

Other Resources

Other resources for the use of roundabouts focused on speed management include the following:

- The second edition of NCHRP Report 672, *Roundabouts: An Informational Guide*, includes extensive information on this countermeasure (Rodegerdts et al. 2010).
- The Minnesota Department of Transportation published a post titled Choosing Effective Speed Reduction Strategies for Roundabouts (MnDOT 2017).
- The IIHS hosts an informational webpage on roundabouts (IIHS 2025).
- The *Waukee [Iowa] Street Design Guide* includes a section on roundabout design (Snyder & Associates 2020).

Disclaimer

The information in this toolbox is intended to show examples of countermeasures that have been shown to be effective or that have been evaluated and show promise. Formal guidance may not be available in the MUTCD, and some countermeasures may require experimental approval. Descriptions, images, best practices, case studies, etc., are examples of use and should not be considered to constitute standards or policies.

References

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Miner, K., and T. Arvidson. 2022. Strategies for Effective Roundabout Speed Reduction. Minnesota Department of Transportation, St. Paul, MN. https://mdl.mndot.gov/_flysystem/fedora/2023-02/2022ric03.pdf.

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Snyder & Associates. 2020. *Waukee Street Design Guide*. City of Waukee, IA. https://www.waukee.org/DocumentCenter/View/9922/2020-Waukee-Street-Design-Guide.