



Roundabouts: Traffic Control, Lighting and Landscaping

An Online Continuing Education Course for Engineers

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CHAPTER 1 - APPLICATION OF TRAFFIC CONTROL DEVICES

1.1 INTRODUCTION

This chapter presents guidelines on the application of traffic control devices associated with roundabouts. The design installation of these elements is an important component in achieving the desired operational and safety features of a roundabout.

The *Manual on Uniform Traffic Control Devices for Streets and Highways (1)*, the latest version of FHWA's *Standard Highway Signs*, and any applicable state and local standards govern the design and placement of traffic control devices, including signs, pavement markings, and signals. This chapter is intended to reflect the state of the practice for signing, marking, and use of other traffic control devices for roundabouts; however, the MUTCD and any relevant state and local policies supersede the guidance of this chapter in the event of a conflict.

A variety of photos are provided within this chapter to illustrate specific signs, markings, or other traffic control features. Inclusion of these photos does not constitute an endorsement of the geometric features captured, which are not the subject of the photo. Additionally, some photos may contain traffic control devices that reflect the practice of their time and may no longer reflect current practice.

1.2 PRINCIPLES

At roundabouts, pavement markings and signs work together to create a comprehensive system to guide and regulate road users. For signs and pavement markings at roundabouts to provide appropriate guidance, the following general principles should be considered:

- Markings and signs are integral to the design of roundabouts, especially for multilane roundabouts. Markings, in particular, need to be considered during the preliminary design stages, rather than fitting them in later in the design process.
- Markings and signs complement the geometric design of the roundabout. They clarify the rules of the road to the user, but they do not create the safety characteristics to the extent the geometric design does.
- Markings and signs should be compatible with each other to present a consistent message to the road user. Likewise, markings on approaches to the roundabout should be compatible with circulatory roadway markings.
- Markings and signs should facilitate through and turning movements in a manner such that drivers choose the appropriate lane when approaching a roundabout and then do not need to change lanes within the circulatory roadway before exiting in their desired direction.
- Approach markings should provide adequate time and distance for approaching drivers to select the appropriate lane for their desired exit.

These principles also extend to the designation of lanes on approaches to roundabouts:

- *Traffic volume considerations and roundabout operations.* Roundabouts should be designed with the appropriate number and assignment of lanes to handle the expected through, left-turning, and right-turning traffic. This may require more than one lane to handle the expected demand for some movements and may also require that some lanes be used for multiple movements.
- *Balanced lane use.* Lane use should be balanced as much as practical. In some situations, certain lane designations (or the lack thereof) may result in the overuse of some lanes for certain movements, resulting in unnecessarily long queues and congestion. This can also result in reduced safety as motorists try to bypass congestion by choosing inappropriate lanes for their desired movements. This is challenging when traffic patterns vary widely throughout the day.
- *Exit lane requirements.* The number of exit lanes provided should be the minimum required to handle the expected exit volume. However, drivers have a reasonable expectation that there will be an exit lane to receive each corresponding entry lane (e.g., two exit lanes to receive a double left turn).

1.3 PAVEMENT MARKINGS

Typical pavement markings for roundabouts delineate the entries, exits, and the circulatory roadway, providing guidance for pedestrians and vehicle operators. This section discusses the application of some of the more relevant pavement markings at roundabouts.

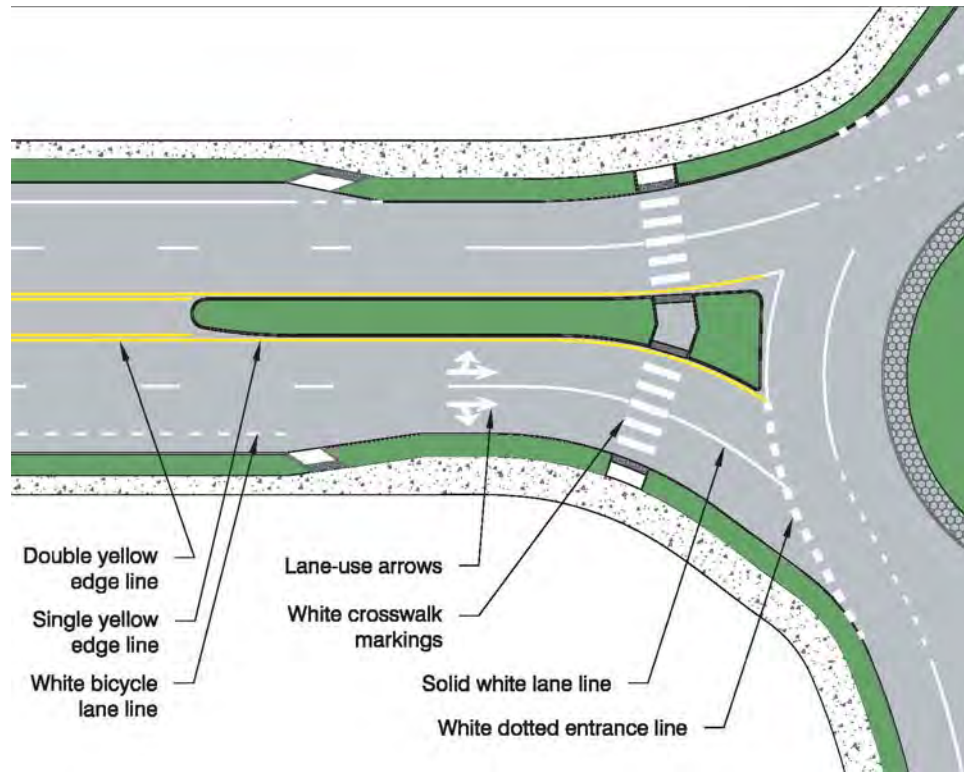
1.3.1 APPROACH AND DEPARTURE PAVEMENT MARKINGS

Approach and departure pavement markings consist of lane lines, edge lines, lane-use arrows, other pavement word and symbol markings, yield lines, and crosswalk markings. Exhibit 1-1 shows typical approach and departure pavement markings. The following sections discuss these in more detail.

1.3.1.1 Centerlines and Edge Lines

Typically, yellow edge lines should be provided along splitter islands at the left edge of the approach and departure roadways and at the left edge of right-turn bypass roadways to enhance driver recognition of the changing roadway. Optionally, edge stripes may be omitted along splitter islands, allowing the islands themselves to provide edge delineation.

Double yellow centerline markings representing a two-direction no-passing zone should be used on undivided roadways on the approach to the splitter islands. Immediately before the splitter island the double yellow centerline markings should split into two double yellow markings, creating a taper to the raised splitter island. Yellow diagonal markings may be placed in the neutral area between the two sets of



double yellow lines. For small splitter islands [area less than 75 ft² (7 m²)], the island may consist of pavement markings only, in the form of two sets of double yellow lines or marking the entire splitter island yellow. However, raised splitter islands should be used where possible.

White edge line markings may be used along the right side of the approach and departure roadways adjacent to the outside curb. White edge line markings should be used along the right side of approach and departure roadways adjacent to right-turn bypass islands to enhance driver recognition of the changing roadway.

Raised pavement markers may be used to supplement edge lines. These provide additional visibility at night and in inclement weather. However, they increase maintenance costs and can be troublesome in areas requiring frequent snow removal. In addition, raised pavement markers should not be used in the path of travel of bicyclists.

1.3.1.2 Lane Lines

As indicated in the MUTCD, white lane line markings should be used on multilane approaches. White lane lines should also be used on multilane departures. Solid white lane lines are recommended on roundabout approaches and departures to discourage lane changes in the immediate vicinity of the roundabout, as shown in Exhibit 1-1. Solid lane lines provide the following benefits:

- As at traditional signalized intersections, solid lane lines on approaches can improve safety by reducing the likelihood of sideswipe crashes caused by last-minute lane changes.

Solid white lane lines are recommended on roundabout approaches and departures.

- Solid lane lines on approaches and departures can discourage drivers from cutting across multiple lanes to attain a faster path through the roundabout. Using solid lane lines throughout the area of deflection can be used to provide this benefit.
- Solid lane lines can be used to discourage lane changes immediately before crosswalks to reduce the likelihood of multiple-threat crashes between vehicles and pedestrians.

On flared approaches to roundabouts, the lane lines in the flared section should extend back as far from the circulatory roadway as possible. For example, when flaring from one to two lanes, as soon as there is paved entry width of 20 ft (6 m) available, the lane line should begin, creating two 10-ft (3-m) approach lanes that will typically continue to widen approaching the circulatory roadway.

White channelizing lines are recommended on the approach to and departure from right-turn bypass islands, where traffic passes on both sides of the islands. Some agencies have used channelizing lines to create painted islands between entry lanes, sometimes called “vane islands.” These islands, shown in Exhibit 2-2, are believed to assist with deflecting entering vehicles to the appropriate position within the circulatory roadway while providing an overrun area for larger vehicles. White chevron markings may be placed in the neutral area between the channelizing lines.



Wisconsin

Exhibit 2-2
Vane Island between
Entry Lanes

1.3.1.3 Bicycle Lane Markings

Where bicycle lane markings are used on approach roadways, they should be terminated in advance of the circulatory roadway.

On approaches to roundabouts, bicycle lane lines should be terminated as soon as the taper begins and at least 100 ft (30 m) from the edge of the circulatory roadway. The bicycle lane lines should be dotted for the last 50 to 200 ft (15 to 60 m) to

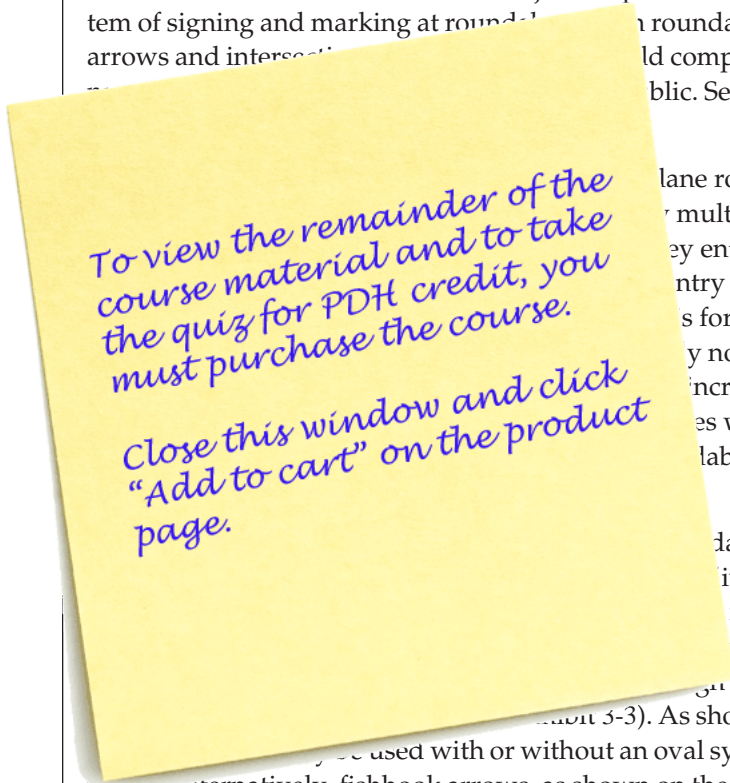
Bicycle lane markings should be terminated in advance of the circulatory roadway.

give advance notice to cyclists that they need to merge, providing more room for them to achieve this maneuver and find an appropriate gap in traffic.

On roundabout departures, a dotted line should be used through the diverging taper, and the solid bike lane line should resume as soon as the normal bicycle lane width is available.

1.3.1.4 Lane-Use Arrows

Lane-use arrows are one of the major components of the comprehensive system of signing and marking at roundabouts. In roundabout approaches, lane-use arrows and intersection markings should complement each other and be consistent with the needs of the public. See Section 1.4.1.6 for a



lane roundabouts. Lane-use arrows are used on multilane roundabout to assist drivers as they enter the roundabout. On a roundabout, the entry lane is for left turns and the right lane is for right turns and through traffic. Lane-use arrows are not necessary. As roundabouts become increasingly important. Lane-use arrows are used on roundabouts with double left-turn or right-turn lanes. Roundabouts where lane-use

Roundabouts internationally. In the United States, individual states regarding the use of lane-use arrows on roundabout with respect to the design of the roadway. As described in the design of lane-use arrows on the roundabout (Exhibit 3-3). As shown on the left, normal lane-use arrows may be used with or without an oval symbolizing the central island. Alternatively, fishhook arrows, as shown on the right, may be used, with or without an oval symbolizing the central island. In choosing a lane-use arrow design, designers should consider the general practices within a city, region, or state. As a cautionary note, the more complex lane-use arrow designs may more

Exhibit 3-3
Lane-Use Arrow Options for Roundabout Approaches

