

This course was adapted from the Department of Transportation, Publication No. DOT-FHWA-RD-00-067, “Understanding Roundabouts”, which is in the public domain.

Exhibit 7-23. Recommended street illumination levels.

Street Classification	Area Classification	Average Maintained Illuminance Values	Illuminance Uniformity Ratio (Average to Minimum)
Arterial	Commercial	17 lx (1.7 fc)	3 to 1
	Intermediate	13 lx (1.3 fc)	
	Residential	9 lx (0.9 fc)	
Collector	Commercial	12 lx (1.2 fc)	4 to 1
	Intermediate	9 lx (0.9 fc)	
	Residential	6 lx (0.6 fc)	
Local	Commercial	9 lx (0.9 fc)	6 to 1
	Intermediate	7 lx (0.7 fc)	
	Residential	4 lx (0.4 fc)	

Definitions:

- Commercial A business area of a municipality where ordinarily there are many pedestrians during night hours. This definition applies to densely developed business areas outside, as well as within, the central part of a municipality. The area contains land use which attracts a relatively heavy volume of nighttime vehicular and/or pedestrian traffic on a frequent basis.
- Intermediate Those areas of a municipality often with moderately heavy nighttime pedestrian activity such as in blocks having libraries, community recreation centers, large apartment buildings, industrial buildings, or neighborhood retail stores.
- Residential A residential development, or a mixture of residential and small commercial establishments, with few pedestrians at night.

Note: Values in table assume typical asphalt roadway surface (pavement classification R2 or R3). Consult the IES document for other pavement surfaces.

Source: Illuminating Engineering Society RP-8 (8)

7.3.3 General recommendations

The primary goal of illumination is to ensure perception of the approach and mutual visibility among the various categories of users. To achieve this, the following features are recommended:

- The overall illumination of the roundabout should be approximately equal to the sum of the illumination levels of the intersecting roadways. If the approaching roadways have been designed to the illumination levels given in Exhibit 7-23, this may result in illumination levels at the roundabout ranging from 9 lx (0.8 fc) for roundabouts at the intersection of local streets in residential areas to 36 lx (3.4 fc) for roundabouts at the intersection of arterials in commercial areas. Local illumination standards should also be considered when establishing the illumination at the roundabout to ensure that the lighting is consistent.
- Good illumination should be provided on the approach nose of the splitter islands, at all conflict areas where traffic is entering the circulating stream, and at all places where the traffic streams separate to exit the roundabout.
- It is preferable to light the roundabout from the outside in towards the center. This improves the visibility of the central island and the visibility of circulating vehicles to vehicles approaching to the roundabout. Ground-level lighting within the central island that shines upwards towards objects in the central island can improve their visibility.

Lighting from the central island causes vehicles to be backlit and thus less visible.

- Special consideration should be given to lighting pedestrian crossing and bicycle merging areas.

7.3.4 Clear zone requirements

As discussed in Chapter 5, the proportion of single-vehicle crashes at roundabouts is high compared to other intersection types. This is because roundabouts consist of a number of relatively small-radii horizontal curves for each traveled path through the roundabout. Drivers travel on these curves with quite high values of side friction, particularly at roundabouts in higher speed areas. Single-vehicle crashes, which predominantly involve out-of-control vehicles, increase with an increased amount of side friction.

Because of the relatively high number of out-of-control vehicles, it is desirable to have adequate amounts of clear zone where there are no roadside hazards on each side of the roadway. Lighting supports and other poles should not be placed within small splitter islands or on the right-hand perimeter just downstream of an exit point. Lighting poles should be avoided in central islands when the island diameter is less than 20 m (65 ft).

The reader should refer to the AASHTO *Roadside Design Guide* for a more detailed discussion of clear zone requirements (9).

7.4 Work Zone Traffic Control

During the construction of a roundabout it is essential that the intended travel path be clearly identified. This may be accomplished through pavement markings, signing, delineation, channelizing devices, and guidance from police and/or construction personnel, depending on the size and complexity of the roundabout. Care should be taken to minimize the channelizing devices so that the motorist, bicyclist, and pedestrian has a clear indication of the required travel path. Each installation should be evaluated separately, as a definitive guideline for the installation of roundabouts is beyond the scope of this guide. Refer to Part 6 of the MUTCD for requirements regarding work zone traffic control.

7.4.1 Pavement markings

The pavement markings used in work zones should be the same layout and dimension as those used for the final installation. Because of the confusion of a work area and the change in traffic patterns, additional pavement markings may be used to clearly show the intended direction of travel. In some cases when pavement markings cannot be placed, channelizing devices should be used to establish the travel path.

7.4.2 Signing

The signing in work zones should consist of all necessary signing for the efficient movement of traffic through the work area, preconstruction signing advising the pub-

Construction signing for a roundabout should follow the MUTCD standard.

lic of the planned construction, and any regulatory and warning signs necessary for the movement of traffic outside of the immediate work area. The permanent roundabout signing should be installed where practicable during the first construction stage so that it is available when the roundabout is operable. Permanent signing that cannot be installed initially should be placed on temporary supports in the proposed location until permanent installation can be completed.

7.4.3 Lighting

Permanent lighting, as described in Section 7.3, should be used to light the work area. If lighting will not be used, pavement markings, as described in Section 7.2, should be used.

7.4.4 Construction staging

Construction staging should be considered during the siting of the roundabout, especially if it must be built under traffic.

As is the case with any construction project, before any work can begin, all traffic control devices should be installed as indicated in the traffic control plan or recommended typical details. This traffic control shall remain in place as long as it applies and then be removed when the message no longer applies to the condition.

Prior to work that would change the traffic patterns to that of a roundabout, certain peripheral items may be completed. This would include permanent signing (covered), lighting, and some pavement markings. These items, if installed prior to the construction of the central island and splitter islands, would expedite the opening of the roundabout and provide additional safety during construction.

When work has commenced on the installation of the roundabout, it is desirable that it be completed as soon as possible to minimize the time the public is faced with an unfinished layout or where the traffic priority may not be obvious. If possible, all work, including the installation of splitter islands and striping, should be done before the roundabout is open to traffic.

If it is necessary to leave a roundabout in an uncompleted state overnight, the splitter islands should be constructed before the central island. Any portion of the roundabout that is not completed should be marked, delineated, and signed in such a way as to clearly outline the intended travel path. Pavement markings that do not conform to the intended travel path should be removed.

It is highly desirable to detour traffic for construction of a roundabout. This will significantly reduce the construction time and cost and will increase the safety of the construction personnel. If it is not possible to detour all approaches, detour as many approaches as possible and stage the remainder of the construction as follows:

1. Install and cover proposed signing.
2. Construct outside widening if applicable.
3. Reconstruct approaches if applicable.

4. Construct splitter islands and delineate the central island. At this point the signs should be uncovered and the intersection should operate as a roundabout.
5. Finish construction of the central island.

7.4.5 Public education

It is important to educate the public whenever there is a change in traffic patterns. It is especially important for a roundabout because a roundabout will be new to most motorists. The techniques discussed in Chapter 2 can be applied during the construction period. The following are some specific suggestions to help alleviate initial driver confusion.

- Hold public meetings prior to construction;
- Prepare news releases/handouts detailing what the motorist can expect before, during, and after construction;
- Install variable message signs before and during construction;
- Use Travelers Advisory Radio immediately prior to and during construction to disseminate information on “How to drive,” etc.; and
- Install signing during and after construction that warns of changed traffic patterns.

Public education during construction is as important as the public education effort during the planning process.

7.5 Landscaping

This section provides an overview of the use of landscaping in the design of a roundabout.

7.5.1 Advantages

Landscaping in the central island, in splitter islands (where appropriate), and along the approaches can benefit both public safety and community enhancement.

The landscaping of the roundabout and approaches should:

- Make the central island more conspicuous;
- Improve the aesthetics of the area while complementing surrounding streetscapes as much as possible;
- Minimize introducing hazards to the intersection, such as trees, poles, walls, guide rail, statues, or large rocks;
- Avoid obscuring the form of the roundabout or the signing to the driver;
- Maintain adequate sight distances, as discussed in Chapter 6;
- Clearly indicate to the driver that they cannot pass straight through the intersection;
- Discourage pedestrian traffic through the central island; and
- Help blind and visually impaired pedestrians locate sidewalks and crosswalks.

Landscaping is one of the distinguishing features that gives roundabouts an aesthetic advantage over traditional intersections.

7.5.2 Central island landscaping

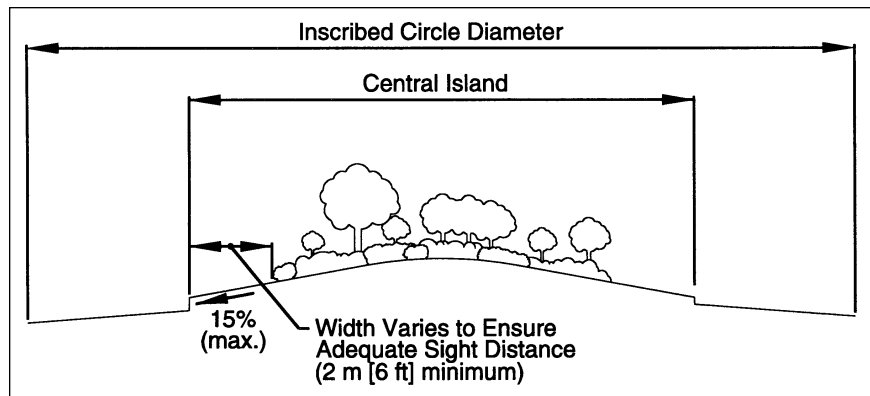
The central island landscaping can enhance the safety of the intersection by making the intersection a focal point and by lowering speeds. Plant material should be selected so that sight distance (discussed in Chapter 6) is maintained, including consideration of future maintenance requirements to ensure adequate sight distance for the life of the project. Large, fixed landscaping (trees, rocks, etc.) should be avoided in areas vulnerable to vehicle runoff. In northern areas, the salt tolerance of any plant material should be considered, as well as snow storage and removal practices. In addition, landscaping that requires watering may increase the likelihood of wet and potentially slippery pavement. Exhibit 7-24 shows the recommended placement of landscaping within the central island.

The slope of the central island should not exceed 6:1 per the requirements of the AASHTO *Roadside Design Guide* (9).

Avoid items in the central island that might tempt people to take a closer look.

Where truck aprons are used in conjunction with a streetscape project, the pavement should be consistent with other streetscape elements. However, the material used for the apron should be different than the material used for the sidewalks so that pedestrians are not encouraged to cross the circulatory roadway. Street furniture that may attract pedestrian traffic to the central island, such as benches or monuments with small text, must be avoided. If fountains or monuments are being considered for the central island, they must be designed in a way that will enable proper viewing from the perimeter of the roundabout. In addition, they must be located and designed to minimize the possibility of impact from an errant vehicle.

Exhibit 7-24. Landscaping of the central island.



7.5.3 Splitter island and approach landscaping

In general, unless the splitter islands are very large or long, they should not contain trees, planters, or light poles. Care must be taken with the landscaping to avoid obstructing sight distance, as the splitter islands are usually located within the critical sight triangles (see Chapter 6).

Landscaping on the approaches to the roundabout can enhance safety by making the intersection a focal point and by reducing the perception of a high-speed through traffic movement. Plant material in the splitter islands (where appropriate) and on the right and left side of the approaches can help to create a funneling effect and induce a decrease in speeds approaching the roundabout. Landscaping in the corner radii will help to channelize pedestrians to the crosswalk areas and discourage pedestrians from crossing to the central island.

7.5.4 Maintenance

A realistic maintenance program should be considered in the design of the landscape features of a roundabout. It may be unrealistic to expect a typical highway agency to maintain a complex planting plan. Formal agreements may be struck with local civic groups and garden clubs for maintenance where possible. Liability issues should be considered in writing these agreements. Where there is no interest in maintaining the proposed enhancements, the landscape design should consist of simple plant materials or hardscape items that require little or no maintenance.

Ensure that whatever landscaping is installed, it will be maintained.

7.6 References

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9. American Association of State Highway and Transportation Officials (AASHTO). *Roadside Design Guide*. Washington, D.C.: AASHTO, 1989.