



Traffic Engineering, Operations & Safety Manual

Chapter 11 Lighting/Electrical/Electronic Systems

Section 4 Roundabout Lighting

11-4-1 Policy and Design Guidelines

May 2015

POLICY

All DOT maintained roundabouts **shall** be illuminated.

All roundabout roadway luminaires on state maintained highway systems **shall** be LED and selected from the Qualified Products List.

Locally maintained Roundabouts **shall** follow the requirements for permitted lighting.

The designer **shall** submit the completed illumination design to the State Lighting Engineer for review and approval. The illumination design **shall** include:

- Copy of approved roundabout illumination form
- design layout
- photometric calculations with summary information showing compliance with illumination and uniformity criteria
- voltage drop calculations

A Roundabout Illumination Form is included to aid in identifying the appropriate roadway and pedestrian classifications and subsequent light levels. The designer **shall** complete this form and submit it to the Region Lighting Engineer for approval prior to beginning the design for a roundabout on the state maintained highway system.

ILLUMINATION DESIGN VALUES AND CALCULATIONS

The roundabout intersection illumination area **shall** be calculated by using the illumination method.

[TEOps 11-2-1](#) explains Roadway and Pedestrian Area Classifications used to determine the recommended Illuminance levels outlined below in Table 1. Note: AASHTO refers to the Pedestrian Area Classifications as Commercial, Intermediate, and Residential Land Uses.

The Recommended Illuminance Levels at Roundabouts is the sum of the recommended values for continuously illuminated approaching roadways.

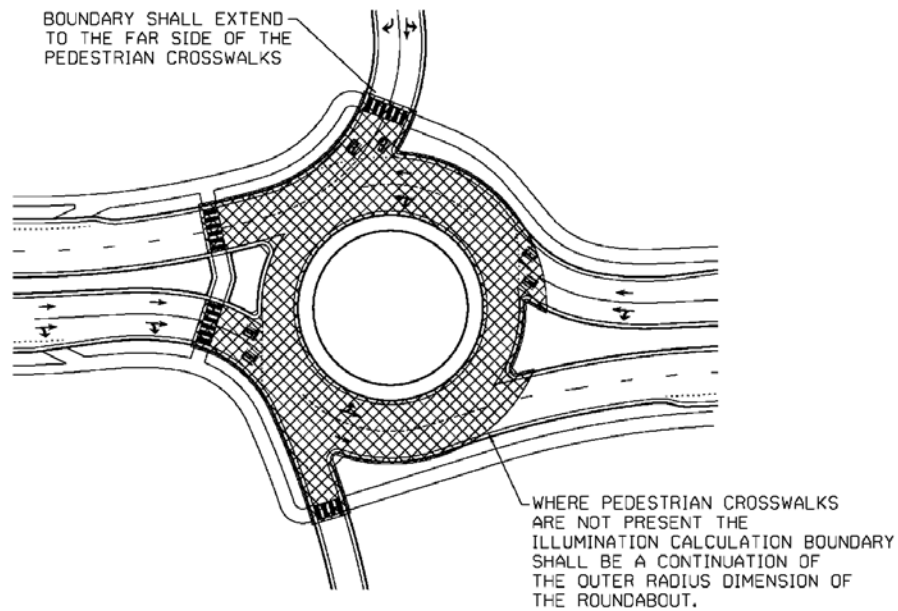
Table 1 below, based on these Roadway and Pedestrian Classifications, for R2 and R3 pavement, summarizes these values. "Minor" is used to identify Minor Arterial.

Table 1. Recommended Illuminance Levels at Roundabouts				
Roadway Classification	Average Maintained Illumination At Pavement by Pedestrian Area Classification in FC			E _{avg} /E _{min}
	High	Medium	Low	
Major/Major	3.16	2.42	1.67	3:1
Major/Minor	2.97	2.23	1.49	3:1
Major/Collector	2.70	2.04	1.39	3:1
Major/Local	2.42	1.86	1.21	3:1
Minor/Minor	2.79	2.04	1.30	4:1
Minor/Collector	2.51	1.86	1.21	4:1
Minor/Local	2.23	1.67	1.02	4:1
Collector/Collector	2.23	1.67	1.12	4:1
Collector/Local	1.95	1.49	0.93	4:1
Local/Local	1.67	1.30	0.74	6:1

For roundabouts where roadways that are not continuously illuminated, the values for Local/Local *should* be used.

ROUNABOUT CALCULATION BOUNDARIES

The calculation boundary is the area to which the illumination levels in Table 1 apply. This area includes the traffic conflict area extending to the far side of the pedestrian path on each of the approaching roadways. If a pedestrian path is not present, the calculation area extends to the outside radius of the roundabout entrance and exit including the entire traffic conflict area. Refer to Figure 1.

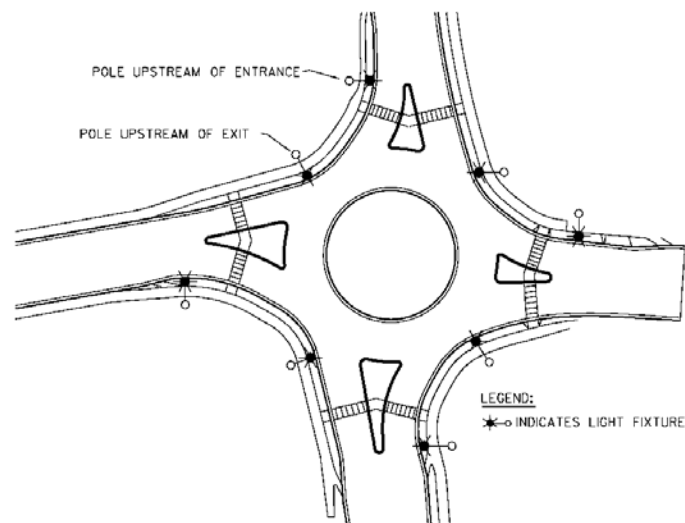
Figure 1. Roundabout Illumination Calculation Boundary

EQUIPMENT PLACEMENT

Light poles *should* be located according to these considerations:

- Minimize the impedance of roundabout approach signage sight lines.
- Place lighting poles on the right hand perimeter just upstream of entrance and exit points.
- Use Engineering judgment to determine appropriate light pole locations and at locations that *may* be too close to errant vehicle paths. In some instances it *may* be necessary to place light poles in larger splitter islands in order to provide good pedestrian recognition.
- Coordinate all clear zone issues with Project Engineer.

Figure 2 below illustrates basic pole placement.

Figure 2. Roundabout lighting placement

TRANSITION LIGHTING

Transition lighting *should* be provided at all roundabouts requiring illumination where the approach roads are not illuminated, and have posted speeds greater than or equal to 35 mph. Transition lighting is implemented to allow the users eyes to adjust from the non-illuminated to the illuminated roadway surface. This gradual lighting adjustment is accomplished incrementally based on the posted speed of the roadway. Recommended transition lighting distances *should* be based on Table 2.

Table 2. Transition Lighting Lengths						
Posted Speed Limit (MPH)	30	35	40	45	50	55

Minimum Transition Lighting Distance (Feet)	-	175	200	250	275	325
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Transition lighting *should* be measured from the outside limits of the Roundabout calculation boundary as shown in Figure 2.

Transition lighting for Highway On-Off ramps *should* be a minimum 275 feet or as dictated by design speed considerations.

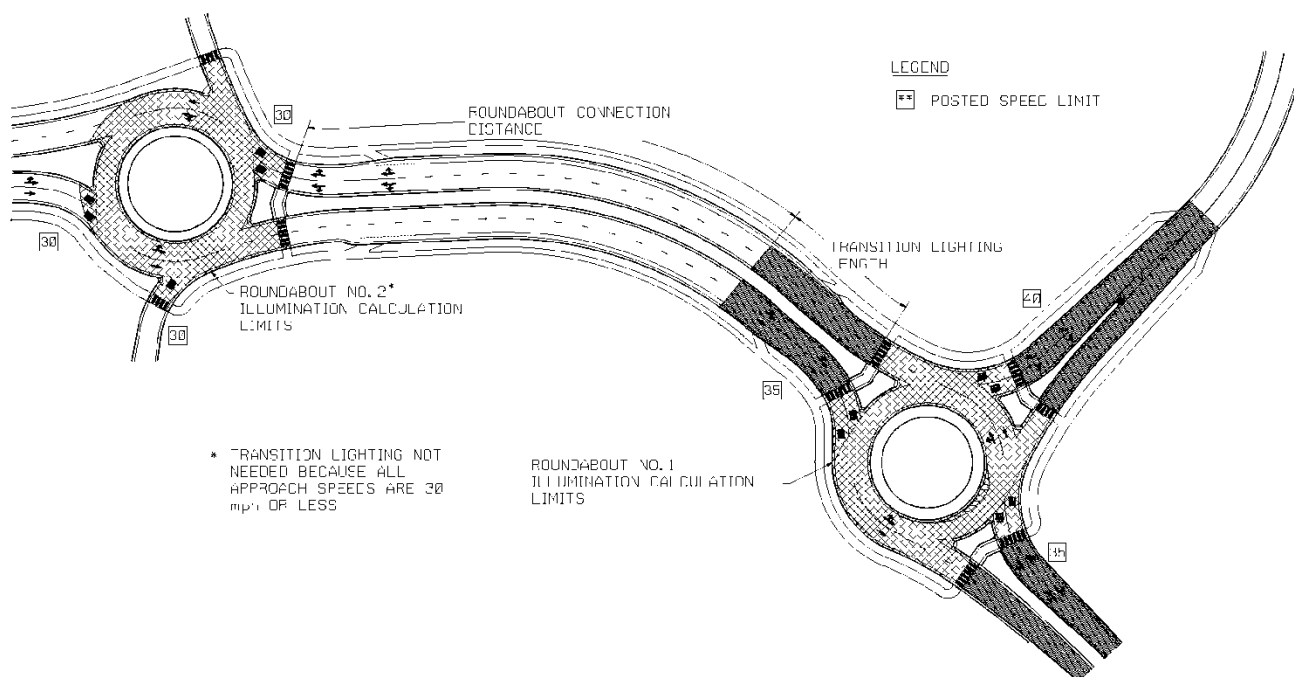
Recommended distances for transition lighting can sometimes extend beyond WisDOT right-of-way. Local municipalities electing not to extend transition lighting to the recommended distance must address this condition in the local agreement.

LIGHTING BETWEEN ADJACENT ROUNDABOUTS

If multiple illuminated roundabouts are placed adjacent to each other, e.g., freeway on/off ramps, the area between the roundabouts *should* be illuminated if the distance is less than or equal to that shown in Table 3. Include transition lighting if applicable. Illumination levels for the span of roadway between the roundabouts **shall** be based on the illumination of the roundabouts.

Table 3. Roundabout Connection Lighting Distance Requirements	
Posted Speed Limit (MPH)	If Distance <= (Feet)
30 mph or less	500
Over 30 mph to 45 mph	750
Greater than 45 mph	1000

Figure 3. Sample transition and connection distance lighting areas



SOURCES

- Design Guide for Roundabout Lighting, DG-19-08, Illuminating Engineering Society of North America (IESNA), 2008.
- Roundabouts: An Informational Guide – U.S. Department of Transportation, Federal Highway Administration, June 2000.
- Roadway Lighting Design Guide, American Association of State Highway and Transportation Officials (AASHTO), 2005.
- The Illumination of Roundabout Intersections, Technical Guide – Centre d'Etudes des Transports Urbain, France.
- Florida Roundabout Guide, Second Edition, Florida Department of Transportation, May 1998.
- General Guidelines for Lighting Design, Plan Preparation and Highway Lighting by Permit, Illinois Department of Transportation, April 2006.

ROUNDAABOUT ILLUMINATION FORM*(To be completed prior to design)***GENERAL INFORMATION:**Location: Wis-164 & Wis-167Street 1: Wis-164 ADT: 24,000 (2030 Forecast)Street 2: Wis-167 ADT: 13,500 (2030 Forecast)Pedestrian Count (1Hr): N/A**ROADWAY AND AREA CLASSIFICATION:**Street 1: Local* Local/ Local chosen because roundabout is located
in area that is not continuously lit.Street 2: Local**DETERMINATION OF ILLUMINATION VALUES:***Use values from Recommended Illuminance Levels at Roundabouts, Table 1 in 11-4-1*Illuminance Value: .74 Foot Candles Eavg/Emin Value: 6:1

Calculated Design Values utilizing AGI 32 photometric software:

Illuminance Value: .85 Foot Candles Eavg/Emin Value: 4.25:1