

U.S. Department of Transportation

## Federal Highway Administration

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### Center for Accelerating Innovation

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## Nighttime Visibility for Safety

**Improving visibility along corridors, at intersections, and at pedestrian crossings can help reduce nighttime crashes and fatalities.**

The nighttime fatality rate on the Nation's roadways is [three times higher](#) than the daytime rate, and [76 percent](#) of pedestrian fatalities occur at night. Enhancing nighttime visibility for drivers and other road users will save lives. Several countermeasures and approaches are available that agencies can employ to improve visibility and reduce fatalities.

### A Visibility Problem with Visible Solutions

FHWA has used a focused approach to safety for many years, based on findings that [almost 90 percent](#) of the traffic fatalities in the United States happen in three main areas:

- Intersections
- Pedestrians and bicyclists
- Roadway departures

Enhancing visibility in these three areas with a targeted application of cost-effective and proven lighting and traffic control device countermeasures can address a large part of the nighttime safety problem. The improvements range from lighting training and design to traffic control devices for vulnerable users, to ensuring these devices can be seen and are effective for all road users.

Available tools include proven safety countermeasures and products, such as those championed by FHWA's Safe Transportation for Every Pedestrian ([STEP](#)) and Focus on Reducing Rural Roadway Departures ([FoRRRwD](#)) initiatives, as well as updated and new tools for lighting design and application of traffic control devices.

### Benefits

Implementing measures to enhance nighttime visibility can save lives and, in some cases, reduce energy costs.

**Intersections.** Nighttime crashes at rural and urban intersections can be reduced by [33 to 38 percent](#) using well-designed lighting. Adequate intersection lighting can help reduce nighttime pedestrian-injury crashes by [42 percent](#). In addition, light-emitting diode (LED) luminaires use less energy than traditional ones, like high-pressure sodium luminaires, creating cost savings.

**Pedestrians and Bicyclists.** Crosswalk visibility enhancements for pedestrians such as rectangular rapid flashing beacons ([47-percent reduction](#)) or advance markings and signs ([25-percent reduction](#)) make it safer for people to cross a road. Many of these countermeasures are also cost-effective

and relatively easy to install.

**Roadway Departures.** Horizontal curve delineation enhancements using chevrons ([16- to 25-percent reduction](#)), in-lane pavement markings ([35- to 38-percent reduction](#)), or fluorescent sheeting ([18-percent reduction](#)) can alert drivers to upcoming curves and can be used individually or in combination with each other or other countermeasures to reduce fatalities.

## State of Practice

Communities across the Nation are already benefiting from the use of many of these countermeasures.

- The Minnesota Department of Transportation (MnDOT) developed a process to streamline prioritization and funding of lighting installation at higher-risk rural intersections. MnDOT's process allows luminaires to be proactively installed through systemic analysis on both District and County Road Safety Plans. Since implementation, MnDOT has noticed a reduction in nighttime crashes at the rural intersections where lighting was installed.
- The Florida DOT researched lighting solutions and directed \$100 million to its districts to replace high-pressure sodium lighting with LEDs for improved pedestrian visibility, resulting in enhancements at approximately [80 percent](#) of the State's most dangerous intersections.
- Bonner County, ID, improved visibility at curves by using edge lines and delineators on 31 roadways to address roadway departure crashes. The edge lines are a durable pavement marking with a 10-year expected life. Delineators are installed at a 200-foot spacing (closer on sharp curves), are low cost, can be installed by maintenance crews, and are visible in snow conditions.
- The North Carolina DOT (NCDOT) evaluated durable pavement markings and wider lines (6 inches versus 4 inches) and found that while the 6-inch stripes had better crash reduction, using 4-inch stripes allows the agency to treat more miles of roads for the same amount of money, resulting in a larger overall crash reduction. NCDOT plans to use the wider lines on select roads with concentrations of lane departure crashes.

## Contacts

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## Resources

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[Fact sheet](#)

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[Nighttime Visibility General Information](#)

[Pedestrian Lighting Primer](#)

[Lighting for Pedestrian Safety factsheet](#)

[Lighting-A Florida Case Study on a Proven Safety Countermeasure \(video\)](#)

[FHWA Minimum Sign Retroreflectivity Requirements](#)

[Implementation Tools-Sign Retroreflectivity Methods Table](#)

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