

Speed Management Toolbox for Rural, Urban, and Suburban Facilities

Countermeasures for Speed Management at Intersections and Pedestrian Crossings

FLASHING BEACONS ON SIGNS

A flashing beacon is a supplementary traffic control device that can be mounted to the top of a stop sign or to the post of an advance intersection or other warning sign (Figure 1). The flashing beacon draws attention to the sign on which it is mounted and provides a warning to drivers that they need to slow and subsequently stop or take some other action. Flashing beacons also increase visibility, particularly at night and during low-visibility conditions (e.g., adverse weather, fog).



Image source: Hallmark et al. 2018

Figure 1. Flashing beacon mounted to a stop sign

Considerations for Implementation

Since beacons mounted to signs do not physically impact road users, they can be used in most roadway settings. 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
	No concerns
	No concerns
	Flashing lights may startle horses
	No concerns
	No concerns
	No concerns

Table 2. Implementation considerations for different roadway types

Roadway Type	Considerations
Urban	Appropriate for most situations
Suburban collector	Appropriate for most situations
Suburban arterial	Appropriate for most situations
School zone	Appropriate for most situations
High to low speed transition	Appropriate for most situations
Rural high-speed arterial	Appropriate for most situations
Rural curve	Appropriate for most situations
Rural village	Appropriate for most situations
Rural unpaved	Appropriate for most situations

A flashing beacon can be set to flash continuously, which provides a general warning to drivers of an upcoming stop or warning sign. When used with a stop sign, the device can also be set to flash only if an approaching vehicle is traveling at a speed that is likely too high for the driver to slow and stop. When used with a warning sign, the device can be set to flash only when a driver is traveling above a set speed threshold (e.g., 5 mph over the posted speed limit). In this case, the device only targets vehicles that are exceeding a certain speed.

Flashing beacons can be used on any stop sign (rural, urban, suburban, high to low speed transition zones). When used on warning signs, the most common applications include advance intersection and curve warning signs. A flashing beacon is not the same countermeasure as a beacon that alerts drivers that an upcoming signal is changing or a beacon used in a school zone to reduce speed during school hours.

Some agencies use flashing beacons sparingly to avoid drivers becoming accustomed to them.

Stop sign-mounted beacons may be most effective when installed at the following locations (ITE 2015):

- Where drivers have a history of noncompliance with intersection traffic control
- Where the existing stop sign or intersection is not conspicuous

Effectiveness

Crash Reduction

Crash reduction factors (CRFs) for flashing beacons are summarized in Table 3.

Table 3. Crash reduction factors for flashing beacons

Iowa DOT Planning-Level Guidance	Iowa-Specific Studies	National Studies
- Flashing beacons on existing stop signs for four-leg intersections ✓ CRF = 5 for all crashes	- Stop sign beacons at rural intersections (Goswamy et al. 2019): ✓ CRF = 18 for nighttime; all crashes ✓ CRF = 54 for nighttime; injury	- Stop sign beacons (Srinivasan et al. 2008): ✓ CRF = 5 for all crashes; all severities ✓ CRF = 10 for all crashes; injury ✓ CRF = 8 for rear end; all severities ✓ CRF = 13 for angle crashes; all severities - Beacons on stop ahead signs (Srinivasan et al. 2008): ✓ CRF = 5 for all crashes; all severities ✓ CRF = 10 for all crashes; injury ✓ CRF = 8 for rear end; all severities ✓ CRF = 13 for angle crashes; all severities

Speed Reduction

Most studies that have evaluated flashing beacons have focused on stop sign beacons, but none of these studies have assessed the devices' speed reduction impact.

Examples of Applications

Flashing beacons on stop signs are a common application in Iowa. The Iowa Department of Transportation (DOT) advocates the use of stop sign-mounted beacons rather than overhead flashing beacons.

Advantages

In terms of speed and crash reductions, the main advantages of sign-mounted flashing beacons include the following:

- Do not physically impact driving, bicycling, or walking paths
- Can be set to activate only for problem drivers
- Provide high visibility
- Are low cost
- Are especially effective for nighttime and low-visibility conditions
- Can be used with most existing signposts
- Can be set to flash continuously or only when a vehicle exceeds a set speed threshold (similar to a dynamic speed feedback sign)

Disadvantages

In terms of speed and crash reductions, the main disadvantages of sign-mounted flashing beacons include the following:

- Cost more than traditional signs
- Require a power source
- May exhibit reduced effectiveness if overuse results in drivers becoming acclimated

Other Resources

Other resources for the use of sign-mounted flashing beacons focused on speed management include the following:

- The *Unsignalized Intersection Improvement Guide* from the Institute of Transportation Engineers includes a section on stop beacons (ITE 2015).

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

- Goswamy, A., S. Hallmark, G. Basulto-Elias, and M. Pawlovich. 2019. Safety evaluation of stop-sign mounted beacons—A cross-sectional study. *Journal of Transportation Technologies*, Vol. 9, No. 1.
- Hallmark, S. L., N. Hawkins, R. Thapa, S. Knickerbocker, and J. Gaspar. 2018. *Evaluation of Intersection Collision Warning Systems in Minnesota*. Minnesota Department of Transportation.
- ITE. 2015. Install a Stop Beacon. *Unsignalized Intersection Improvement Guide*. Institute of Transportation Engineers.
<https://toolkits.ite.org/uiig/treatments/07%20Stop%20Beacon.pdf>.
- Srinivasan, R., D. Carter, B. Persaud, K. Eccles, and C. Lyon. 2008. Safety evaluation of flashing beacons at stop controlled intersections. 87th Annual Meeting of the Transportation Research Board, January 13–17, Washington, DC.