Tips for installing advance pedestrian warning signs and RRFBs

4 MIN. READ
SEPTEMBER 29, 2022

As a pedestrian safety countermeasure, the benefits of rectangular rapid-flashing beacons (RRFBs) are well-documented. Commonly installed with crosswalk signage at midblock and other unsignalized crossings like roundabouts, they can increase driver yield rates to 98% and decrease crashes involving pedestrians by up to 47%, according to the FHWA.

But they are not a silver bullet on their own. Like all of the countermeasures identified in the FHWA's Proven Safety Countermeasures initiative (PSCi), they are most effective when used in conjunction with other interventions and strategies. For RRFBs, that includes road diets, curb extensions, refuge islands, overhead lighting, and advance pedestrian warning signs, which we will cover in detail here.

What is an advance pedestrian warning sign?

Warning signs as they are defined in the MUTCD are non-regulatory (i.e. non-enforceable) roadway signs that give notice of a situation that might not be readily apparent. In the case of advance pedestrian warning signs, they tell drivers that they are approaching a crosswalk and should be aware of the potential for pedestrians on or near the roadway.

The sign the MUTCD recommends for this is actually the same one they recommend be used at the crosswalk—the W11-2—however, instead of pairing it with a downward sloping arrow plaque (W16-7P), they suggest using an "AHEAD" (W16-9P) or "XX

FEET” (W16-2P) distance plaque. School crossing (S1-1) and trail crossing (W11-15) signs may also be used if appropriate.

When do you use an advance pedestrian warning sign?

One of the main criteria for a marked crosswalk is good sight lines, meaning the roadway ahead of the crosswalk is long enough that a driver traveling at or near the posted speed limit has time to perceive, recognize, and react—in this case, yield to—to an incoming pedestrian. The MUTCD calls this “Perception-Response Time” or PRT.

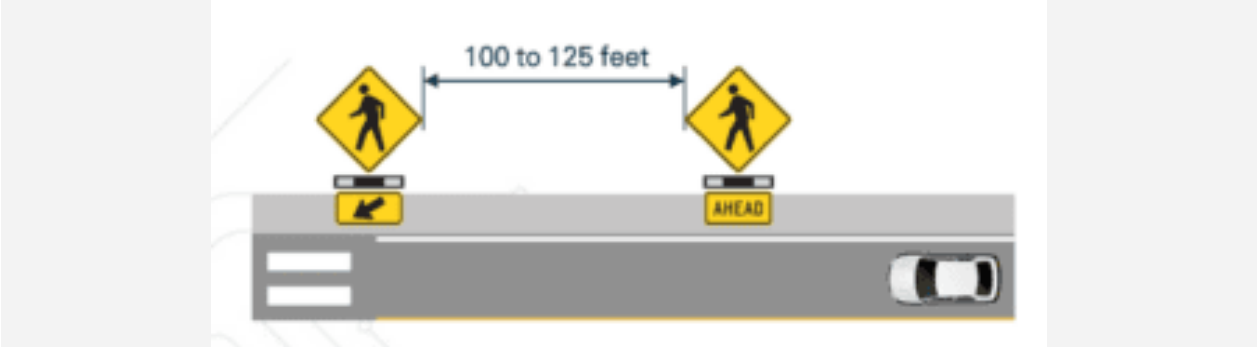
Vehicle speed (mph)	Stopping sight distance (feet)
15	80
20	115
25	155
30	200
35	250
40	305
45	360
50	425
50	495

Researchers have performed extensive tests to determine under a variety of conditions, the results of which can be found in the AASHTO Green Book. The table on the right shows the minimum recommended stopping sight distances on level roadways.
Many crosswalks, however, don't meet these recommendations. Marked crosswalks are often located near horizontal or vertical curves, as well as in locations where obstructions like parked cars can block drivers' view of a crosswalk. **Scenarios such as these, where road users don't have enough time or distance to see and react to changing conditions, are examples of when to use an advance pedestrian warning sign.**

Can an RRFB be added to an advance warning sign?

Yes! Adding an RRFB light bar to an advance warning sign is a highly effective way of enhancing sign conspicuity and driver compliance. Though not included in the MUTCD at the time of writing, the FHWA has provided interim approval for the RRFB under IA-21 since 2018. Here's what they say about using the RRFBs as part of an advance warning:
"In the event sight distance approaching the crosswalk at which RRFBs are used is less than deemed necessary by the engineer, an additional RRFB may be installed on that approach in advance of the crosswalk, as a pedestrian-actuated conspicuity enhancement to supplement a W11-2 (Pedestrian), S1-1 (School), or W11-15 (Trail) crossing warning sign with an AHEAD (W16-9P) or distance (W16-2P or W16-2aP) plaque. If an additional RRFB is installed on the approach in advance of the crosswalk, it shall be supplemental to and not a replacement for the RRFBs at the crosswalk itself."
In other words, if an advance warning sign is warranted, an RRFB can be added, so long as RRFBs have also been implemented at the crosswalk itself. Additionally, all RRFBs, whether they are at the crossing or in advance of it, must begin and cease flashing simultaneously.

Where should the advance warning sign/RRFB be placed?



Advance warning signs and RRFBs should be placed 100-125 feet ahead of a crosswalk with limited visibility.

Although there is nothing in the MUTCD—or IA-21—that specifies the placement of advance warning signs with RRFBs specifically, Section 2C.05 does offer some guidance on warning signs generally, which they intend as a "starting point for determining appropriate advance placement."
As RRFBs are not recommended for roadways with speed limits greater than 40 mph, we can use the distances included in the Condition B columns, where drivers need to decelerate to 0 mph—a complete stop for a pedestrian. **This leaves us with the guideline of 100-125 feet for an advance warning sign/RRFB.**

Why the discrepancy?

If you've been paying close attention, you might notice a discrepancy between the stopping distances recommended by AASHTO and the distances recommended by the MUTCD (for example, at a speed of 20 mph, AASHTO recommends 115 ft, while the MUTCD recommends 100).
This is explained in a couple of footnotes to the MUTCD table, but essentially, they subtract a sign legibility distance of 180 feet from the AASHTO numbers, and cap the minimum advance placement distance at 100 feet "to provide adequate spacing between signs." These guidelines ensure that drivers have adequate PRT to see and react to the advance warning sign, and help reduce the chances drivers forget the warning message because of other distractions.

In summary, advance pedestrian warning signs can and should be used on roadways where sight lines are limited or where pedestrian crossings may not be expected by motorists. The MUTCD has approved the use of RRFBs with advance pedestrian warning signs and offers some guidance on their placement. However, transportation professionals should always consult their local DOT and exercise engineering judgment. As they say, your mileage may vary!