

# Proven Safety Countermeasures

## Backplates with Retroreflective Borders

Backplates are added to a traffic signal indication in order to improve the visibility of the illuminated face of the signal by introducing a controlled-contrast background. The improved visibility of a signal head with a backplate is then made more conspicuous by framing the backplate with a retroreflective border. Taken together, a signal head equipped with a backplate with retroreflective border is made more visible and conspicuous in both daytime and nighttime conditions, which is intended to reduce unintentional red-light running crashes.

### Background

A project initiated in 1998 by the Insurance Corporation of British Columbia and the Canadian National Committee on Uniform Traffic Control investigated the effectiveness of applying retroreflective tape around the borders of traffic signal backplates. A small number of signalized intersections were treated and followed up with a simple before/after study, which concluded that the enhancement was effective at reducing crashes. A larger number of sites were subsequently treated and a more robust statistical study was performed.



Since their initial introduction in Canada, several U.S. State highway departments and local road agencies have adopted practices and policies concerning this countermeasure. Additionally, the FHWA has encouraged this treatment as a human factors enhancement of traffic signal visibility and conspicuity for older and colorblind drivers. Adding retroreflective borders is also advantageous during periods of power outages when the signals would otherwise be dark. The retroreflective sheeting continues to provide a visible cue for travelers to take note of the dark signal and adjust their actions accordingly. Per the study included in the Crash Modification Factor Clearinghouse, the use of backplates with retroreflective borders may result in a 15 percent reduction in all crashes at urban, signalized intersections.

### Guidance

Backplates with retroreflective borders should be considered as part of efforts to systemically improve safety performance at signalized intersections. Adding a retroreflective border to an existing signal backplate can be a very low-cost safety treatment, as the materials are simple strips of retroreflective sheeting. For existing traffic signals that lack even standard backplates, the addition of backplates with a retroreflective border can often be accommodated on existing mast arm and span wire assemblies, but the structural capacity of the supports must be properly evaluated. The most effective means of implementing this proven safety countermeasure is to adopt it as a standard treatment for signalized intersections across a jurisdiction so that it is consistently included with all new construction and modernization projects, as well as being a worthy retrofit project for existing signals at intersections with red-light running crash histories. It is important to note that the Manual on Uniform Traffic Control Devices (MUTCD) specifically allows this treatment as an option that is discussed in



Part 4. In terms of color and size, implementation of backplates and retroreflective borders must be consistent with the latest edition of the MUTCD.

## Key Resources

Retroreflective Borders on Traffic Signal Backplates – A South Carolina Success Story

<http://safety.fhwa.dot.gov/intersection/resources/casestudies/fhwas09011/>

Manual on Uniform Traffic Control Devices (2009 Edition), Part 4D Traffic Control Signal Features

<http://mutcd.fhwa.dot.gov/htm/2009/part4/part4d.htm#section4D12>

FHWA Interim Approval for Use of Retroreflective Border on Signal Backplates (prior to 2009 Edition)

[http://mutcd.fhwa.dot.gov/pdfs/ia\\_retroborder.pdf](http://mutcd.fhwa.dot.gov/pdfs/ia_retroborder.pdf)

Florida Department of Transportation, Plan Preparation Manual, Chapter 7 Traffic & ITS Design (Section 7.4.17)

<http://www.dot.state.fl.us/rddesign/PPMManual/2009/Volume1/zChap07.pdf>

Senior Mobility Series: Article 4 - Marking the Way to Greater Safety, FHWA Public Roads Volume 70/No. 1

<http://www.fhwa.dot.gov/publications/publicroads/06jul/08.cfm>

Crash Modification Factor (CMF) Clearinghouse [*quick search* “retroreflective backplate”]

<http://www.cmfclearinghouse.org/>

Evaluating Impact on Safety of Improved Signal Visibility at Urban Signalized Intersections

<http://pubsindex.trb.org/view.aspx?id=800943>

Road Safety Performance Associated with Improved Traffic Signal Design and Increased Signal Conspicuity

<http://mutcd.fhwa.dot.gov/texts/miska/miska02.htm#toc>

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FHWA Website: <http://safety.fhwa.dot.gov/intersection/>