

## Retroreflective Borders on Traffic Signal Backplates Increase Visibility

Red-light running is estimated to cause more than 200,000 crashes, 170,000 injuries and approximately 900 deaths per year.<sup>1</sup> One of the reasons for the high number of crashes is driver inability or failure to see the traffic control device in time to comply. Research also demonstrates that the number and severity of crashes can be reduced by using simple, low-cost enhancements such as increasing the visibility of traffic signals (particularly during late-night/early-morning hours) using retroreflective borders on existing backplates to increase the level of driver compliance. The experience of the South Carolina Department of Transportation (SCDOT) demonstrates how transportation agencies can improve safety with this low-cost enhancement.

The SCDOT was concerned about the high number of crashes at some of its urban signalized intersections. Recognizing that poor signal visibility can cause crashes, the SCDOT decided to install retroreflective borders on existing signal backplates at three intersections in the Columbia area that were experiencing a high incidence of crashes, many with injuries.<sup>2</sup> The crash reduction averages in this report reflect the average percent reduction per year based on the difference between the total number of "before" and "after" crashes, observed over a minimum duration of 4 years at each intersection, between 2003 - 2007. The "before" period was 29 months and the "after" period was 25 months for all three intersections.

This article summarizes safety benefits the SCDOT achieved by applying of retroreflective borders on existing signal backplates that reduced crashes at three urban signalized intersections in Columbia, South Carolina.

### LOW-COST IMPROVEMENTS

The treatment involved adding a 3-inch yellow retroreflective border to the face of the existing signal backplates (see Figure 1) in June, 2005. The retroreflective border helps to increase the intersection's visibility during the day for drivers, and even more so at night or under limited visibility conditions.

#### 1) Sumter Highway (US 378) with Lower Richland Boulevard (S-37)

Data showed that 33 crashes occurred before the improvement was made; 21 crashes occurred after the changes. **The treatment resulted in an average crash reduction of 26.2 percent and reduced injury crashes by 31.8 percent per year at this intersection. The total number of late-night/early-morning crashes remained relatively stable.**

#### 2) I-26 Westbound (WB) with Piney Grove Road (S-1280)

Data showed that 13 crashes occurred before the improvement was made; 9 crashes occurred after the changes. **The treatment resulted in an average crash reduction of 19.7 percent, reduced injury**

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<sup>1</sup>Federal Highway Administration, Red-Light Running Web Site (2008), <http://safety.fhwa.dot.gov/intersection/redlight/>.

<sup>2</sup> Existing intersections met minimum *Manual on Uniform Traffic Control Devices* (MUTCD) standards.

crashes by 76.8 percent per year, and also, reduced late-night/early-morning crashes by 85.5 percent per year at this intersection.

### 3) Piney Grove Road (S-1280) with Jamil Road (S-1791)

Data showed that 19 crashes occurred before the improvement was made; 10 crashes occurred after the changes. The treatment resulted in an average crash reduction of 38.9 percent and reduced late-night/early-morning crashes by 56.5 percent per year.

#### The Cost of Improved Safety

The SCDOT had no implementation issues with this countermeasure and the costs for implementing the enhancements were low: approximately \$1,500 per intersection. The installation of the retroreflective border at each intersection was completed within two hours.

The countermeasure installed at these Columbia signalized intersections cumulatively reduced total crashes by approximately 28.6 percent, injury crashes by 36.7 percent, and late-night/early-morning crashes by an average of 49.6 percent per year.

As the SCDOT experience demonstrates, low-cost improvements can effectively improve safety and reduce traffic crashes and their resulting injuries. For more detailed data and results on this success story and other proven intersection safety treatments from across the country, please see the following website: <http://safety.fhwa.dot.gov/intersection>. For more information, contact Ed Rice, Intersection Safety Team Leader, FHWA Office of Safety ([ed.rice@dot.gov](mailto:ed.rice@dot.gov)), or Joey D. Riddle, SCDOT ([RiddleJD@dot.state.sc.us](mailto:RiddleJD@dot.state.sc.us)).



**Figure 1: Retroreflective Borders Installed on Signal Backplates**

OPTIONAL FIGURES:



**Figure 2: Retroreflective Backplate Border**



**Figure 3: Retroreflective Borders  
Installed on Signal Backplates**