NCHRP 17-113 COUNTERMEASURES

Increase Retroreflectivity of STOP Signs

INTERSECTIONS

STOP signs that are more retroreflective help improve driver awareness of intersections.

Implementation Strategy

How and Where to Apply

- Increase the retroreflectivity of STOP signs at intersections with high nighttime crash rates, or poor visibility. Upgrades should be targeted at rural, suburban, and low-lit urban intersections.
- Enhanced retroreflective materials improve nighttime sign visibility, recognition distance, and driver reaction time, especially in dark or wet conditions.
- Retroreflectivity upgrades may be installed during regular sign maintenance cycles or proactively as part of nighttime safety improvement initiatives.

Use in a Safe System Approach

Improving the retroreflectivity of STOP signs supports the SSA by enhancing visual cues for critical decision points, allowing drivers to better anticipate and respond to intersections. This is especially important for older drivers and those traveling unfamiliar routes in dark conditions

Key Stakeholders

State DOTs, Traffic Engineers, Local Law Enforcement

Proactive Implementation

Agencies should proactively assess and replace STOP signs with substandard retroreflectivity levels using night-time visual inspection, mobile retroreflectometers, or sign management systems. Research in Virginia found that upgraded retroreflective STOP signs can reduce total crashes and improve driver compliance without additional infrastructure changes.

Countermeasure Overview

Objective: Improve driver awareness of intersections as viewed from the intersection approach

Strategy: Provide improved maintenance of STOP signs

Selected Related Countermeasures

- CM1 LED-embedded STOP signs
- CM2 STOP ahead pavement markings
- CM3 Larger STOP sign sizes

Cost: $ (low)

Service Life: 15 years

Benefit-Cost Ratio: 34:1

Targeted Solution

CONTRIBUTING FACTORS	▪ Reduced visibility ▪ Driver inattention ▪ Non-Compliance
TARGET CRASH TYPE	▪ Angle ▪ Rear-end ▪ Turning
ROAD FACILITY TYPE	▪ All
AREA TYPE	▪ All

Safety Linkage

NCHRP 500 Series	SAFE SYSTEM APPROACH
Intersection	Safer Roads
AASHTO'S TOWARD ZERO DEATHS	SAFE SYSTEM ROADWAY DESIGN (TIER 1, TIER 2, TIER 3, TIER 4)
Safer Infrastructure	Tier 4

Better Retroreflective STOP sign. Source: foptraffic.com

Safety Benefits

26% Implementation of STOP signs with higher retroreflectivity helps reduce crash severity in urban areas[1]

16% Reduces risk of rear-end crashes on all roadway types[2]

[1] CMF ID: 6072
[2] CMF ID: 6070

Resources

- Evaluation of Retroreflective Material on Stop Sign Posts in Virginia
- Retroreflective Requirements for Traffic Signs