NCHRP 17-113 COUNTERMEASURES

INTERSECTIONS

Add 3-inch Yellow Retroreflective Sheeting to Signal Backplates

Backplates with yellow retroreflective borders enhance traffic signal visibility in all lighting conditions, aiding driver recognition and safety, especially during power outages.

Implementation Strategy

How and Where to Apply

- Install backplates with retroreflective borders at signalized intersections with high crash rates, poor visibility, complex backgrounds, or high volumes of older drivers or nighttime traffic.
- Mount backplates directly behind signal heads, ensuring a 1–3-inch yellow retroreflective border per MUTCD guidelines, with proper alignment to maintain visibility and contrast against the surrounding environment.
- Not recommended where signals are rarely used, visibility is already sufficient, or added sheeting offers minimal safety improvement.

Use in a Safe System Approach

Retroreflective signal backplates enhance visibility, reduce severe conflicts, support shared responsibility, address human mistakes, and provide proactive, redundant safety by improving signal recognition for all road users.

Key Stakeholders

State DOTs, MPOs, engineering consultants, traffic engineers, active road users.

Proactive Implementation

Proactive implementation involves identifying signalized intersections with visibility concerns, high nighttime crash rates, or frequent power outages. Traffic engineers should prioritize locations where improved signal conspicuity can enhance safety, especially for older drivers or in visually cluttered environments. Installing retroreflective backplates in advance of crash patterns strengthens intersection safety before problems escalate.

Countermeasure Overview

Objective: Improve Sight Distance and/or Visibility Between Motor Vehicles and Pedestrians.
Strategy: Improve Reflectorizing/ Conspicuity of Pedestrians.

Selected Related Countermeasures

- CM1 High-visibility signal heads
- CM2 Advance warning flashers
- CM3 Improved intersection lighting

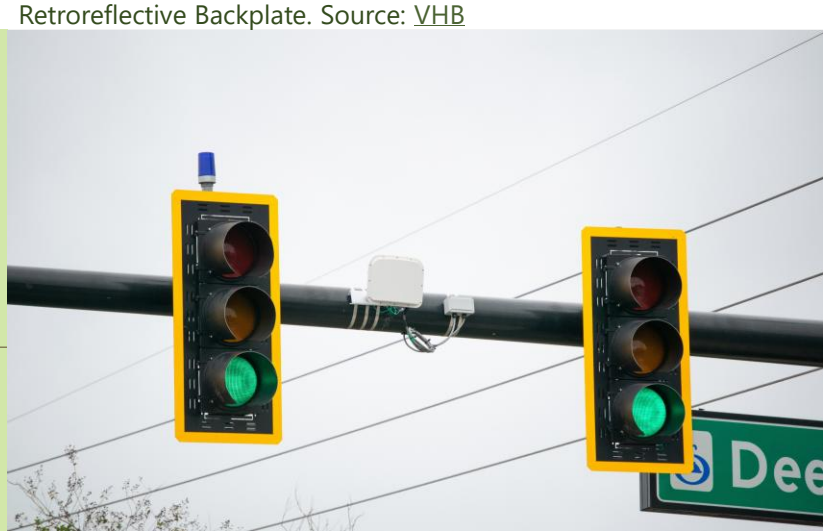
Cost: $ (Low)
Service Life: 10 years

Targeted Solution

CONTRIBUTING FACTORS	▪ Reduced Visibility ▪ Driver Inattention/ Distraction
TARGET CRASH TYPE	▪ Angle ▪ Rear-end ▪ Turning
ROAD FACILITY TYPE (ARTERIAL, COLLECTOR, LOCAL)	▪ N/A
AREA TYPE	▪ Urban

Safety Linkage

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



Retroreflective Backplate. Source: VHB

Safety Benefits

15%

Reduces all crash types and severity levels on urban road (CMF ID: 1410)

Resources

- FHWA backplates-retroreflective-borders
- USDOT retroreflective-backplates