NCHRP 17-113 COUNTERMEASURES

Improve Visibility of Signal Heads

INTERSECTIONS

The FHWA defines improving signal visibility as enhancing clarity with tools like backplates and placement to reduce crashes by ensuring timely driver response.

Implementation Strategy

How and Where to Apply

- This is applied at signalized intersections with frequent red-light violations, visibility issues, or crash histories, especially in areas with complex backgrounds or poor lighting.
- Install retroreflective backplates and ensure proper signal alignment, mounting height, and lateral positioning per MUTCD standards to maximize visibility and driver recognition.
- Best suited for high-crash signalized intersections or areas with poor visibility. Avoid where Low-risk, well-lit intersections or those with structural limits like high wind, as added backplates may add unnecessary wind load or costs.

Key Stakeholders

State DOTs, MPOs, traffic signal engineers, engineering consultants, safety advocacy groups.

Proactive Implementation

To implement this countermeasure proactively, agencies should assess intersections with high nighttime traffic, frequent red-light running, or poor signal visibility. Evaluating site conditions and crash trends can help prioritize locations where enhanced signal conspicuity would prevent future incidents. Applying retroreflective backplates in advance of crashes offers a cost-effective way to boost driver awareness and intersection safety.

Use in a Safe System Approach

Improving signal visibility with backplates and better placement supports the Safe Roads pillar of the Safe System Approach. It enhances clarity to handle human errors and vulnerabilities, ensuring drivers respond in time and preventing crashes or serious injuries.

Countermeasure Overview

Objective: Improve driver awareness of intersections and signal control.
Strategy: Improve visibility of signals and signs at intersections.

Selected Related Countermeasures

- CM1 LED-enhanced signal lenses
- CM2 High-visibility signal backplates
- CM3 Advance warning flashing beacons

Cost: $ (Low)
Service Life: 10 years
Benefit-Cost Ratio: 10.0:1

Targeted Solution

CONTRIBUTING FACTORS	▪ Reduced Visibility ▪ Driver Inattention ▪ Red light running
TARGET CRASH TYPE	▪ Angle ▪ Rear-end ▪ Turning
ROAD FACILITY TYPE	▪ N/A
AREA TYPE	▪ Urban

Safety Linkage

NCHRP 500 Series

Signalized Intersection

AASHTO'S TOWARD ZERO DEATHS

Safer Infrastructure

SAFE SYSTEM APPROACH

Safe Roads

SAFE SYSTEM ROADWAY DESIGN

TIER 1
TIER 2
TIER 3
TIER 4

Tier 4

Safety Benefits

7% Reduces all types of crashes and severity levels in urban areas (CMF ID : 1430)

3% Reduces all types of crashes with severity levels K, A, B, and C in urban areas(CMF ID : 1431)

Resources

- FHWA proven-safety-countermeasures
- Signal head improvement

Signal Visibility. Source: VHB.