NCHRP 17-113 COUNTERMEASURES

Improve Signal Visibility

INTERSECTIONS

Improving signal visibility includes a range of enhancements such as increasing signal lens size, adding new or upgraded back-plates, and installing additional signal heads to ensure better detection and recognition of traffic signals.

Implementation Strategy

How and Where to Apply

- This countermeasure is appropriate for signalized intersections where drivers may have difficulty detecting or interpreting the traffic signal.
- It is especially effective at intersections with crash histories involving red-light running or signal non-compliance.
- Effective at complex, high-volume intersections to reduce red-light violations and driver confusion. In low-volume or rural areas, it may add little benefit while increasing costs and maintenance needs.

Use in a Safe System Approach

This treatment supports the Safe System Approach by enhancing visibility and redundancy, reducing high-speed intersection crashes where human error or distraction may occur.

Key Stakeholders

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

Proactive Implementation

Agencies can prioritize locations based on a systemic risk-based approach that considers factors such as long approach distances, skewed geometry, sun glare patterns, background clutter (e.g., trees or signage), and high speeds. Signal visibility audits, nighttime field reviews, and public complaints related to missed or unclear signals can also help identify candidate locations for implementation.

Countermeasure Overview

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

Targeted Solution

CONTRIBUTING FACTORS	▪ Reduced visibility ▪ Signal non-compliance
TARGET CRASH TYPE	▪ Angle ▪ Rear-end ▪ Turning
ROAD FACILITY TYPE	▪ Urban arterial ▪ Freeways
AREA TYPE	▪ Urban

Safety Linkage

NCHRP 500 Series

Unsignalized 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

Selected Related Countermeasures

- CM1 Install Dual Red Signal Lenses
- CM2 Improve Intersection Illumination
- CM3 Install Advance Signal Warning Flashers

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

Signal Visibility. Source: VHB.

Safety Benefits

10% Reduces nighttime crashes and K, A, B, C types of severities on urban roads (CMF ID: 4111)

0.4% Increases daytime crashes and K, A, B, C types of severities on urban roads (CMF ID: 41110)

Resources

- MUTCD Chapter 3B: Pavement and Curb Markings
- Unsignalized Intersection Improvement Guide
- FHWA Safety Evaluation of STOP AHEAD Pavement Markings