NCHRP 17-113 COUNTERMEASURES

Increase All Red Clearance Interval

INTERSECTIONS

An all-red clearance interval is the period during which all traffic signal indications are red, allowing vehicles that have entered the intersection at the end of the yellow interval to clear before cross traffic receives a green signal.

Implementation Strategy

How and Where to Apply

- This treatment is most applicable at signalized intersections with a documented history of red-light running or angle crashes.
- It is especially useful at intersections with wide cross-sections, high approach speeds, or where clearance behavior studies show that vehicles often remain in the intersection during phase transitions.
- Engineering analysis using factors such as approach speed, intersection geometry, and vehicle length helps determine appropriate all-red durations.

Use in a Safe System Approach

Increasing the all-red interval supports the Safe System principles of forgiving infrastructure and managing human error by accounting for late entries and helping to prevent severe right-angle collisions during signal phase changes.

Key Stakeholders

Agency maintenance personnel

Proactive Implementation

Agencies can implement increased all-red intervals proactively during regular signal retiming cycles or based on systemic risk analysis. Intersections with high approach speeds, poor compliance with yellow intervals, or limited visibility benefit most from this low-cost measure.

Countermeasure Overview

Objective: Reduce frequency and severity of intersection conflicts through traffic control and operational improvements

Strategy: Optimize clearance intervals

Selected Related Countermeasures

- CM1 Increase Yellow Change Interval
- CM2 Improve Signal Visibility
- CM3 Install Dynamic Signal Warning Flashers

Cost: $ (low)

Service Life: 10 years

Benefit-Cost Ratio:

Targeted Solution

CONTRIBUTING FACTORS	▪ Red-light running ▪ Driver misjudgment
TARGET CRASH TYPE	▪ Speeding ▪ Red light running
ROAD FACILITY TYPE	▪ Urban arterial ▪ Rural major ▪ Minor arterial
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 3

Increase All Red Clearance Interval Source: traffic lights

Safety Benefits

20% Reduces right-angle (T-bone) crashes

[1] CMF ID: 4211

Resources

- FHWA Signalized Intersections: Informational Guide (FHWA-HRT-04-091)
- MUTCD Section 4D.26: Clearance Intervals
- ITE Traffic Signal Change and Clearance Intervals: Recommended Practice
- NCHRP Report 731: Guidelines for Timing Yellow and All-Red Intervals