NCHRP 17-113 COUNTERMEASURES

Install Intersection Conflict Warning System (ICWS)

INTERSECTIONS

Intersection Conflict Warning Systems (ICWS) are dynamic traffic control devices that use signs and flashers to alert drivers of potential conflicts at unsignalized intersections.

Implementation Strategy

How and Where to Apply

- Apply at unsignalized intersections with frequent angle crashes or limited sight distance, especially in rural or high-speed areas (>45 mph).
- Use where post-mounted flashers alone are insufficient due to skewed geometry, wide cross-sections, or complex sight lines.
- Best suited for rural, high-speed, stop-controlled intersections with sight-line obstructions or crash history, typically at unsignalized intersections; avoid on the major road if the major road volume is high, as it can lead to driver fatigue and reduced effectiveness.

Use in a Safe System Approach

ICWS supports the Safe Roads element of the Safe System Approach. It accommodates human mistakes and vulnerabilities by providing redundant visual warnings, improving driver awareness of cross traffic, and reducing the likelihood of severe crashes.

Key Stakeholders

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

Proactive Implementation

Agencies should identify high-risk intersections based on crash history, geometry assessments, and operating speeds. Installing dual ICWS before crash thresholds or MUTCD signal warrants are reached allows for earlier intervention. Prioritizing rural and multilane corridors enhances equity in safety investments and addresses areas often underserved in infrastructure upgrades.

Countermeasure Overview

Objective: Improve driver awareness of intersections as viewed from the intersection approach.
Strategy: Install larger regulatory and warning signs at intersections.

Selected Related Countermeasures

- CM1 ICWS with Overhead & Post-Mounted Signs/Flashers
- CM2 ICWS for Two-lane at Two-lane Intersections
- CM3 ICWS for Four-lane at Two-lane Intersections

Cost: $$$ (Moderate to High)
Service Life: 10 years
Benefit-Cost Ratio: 27.0:1

Targeted Solution

CONTRIBUTING FACTORS	▪ Failure to yield ▪ Misjudgment of safe gaps ▪ Limited sight distance
TARGET CRASH TYPE	▪ Angle ▪ Rear-end ▪ Turning
ROAD FACILITY TYPE	▪ Minor arterial ▪ Local
AREA TYPE	▪ Rural

Safety Linkage

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

ICWS with Various Messages. Source: Colorado DOT.

Safety Benefits

26% ICWS with overhead-mounted and post-mounted flashers reduce crashes for all crash types and K, A, B, and C severities on rural two-lane roads (CMF ID: 8475)

30% ICWS two-lane Intersections reduces crashes of all types and severities A, B, and C on rural roads (CMF ID: 8439)

Resources

- FHWA: Safety Evaluation of Intersection
- NCHRP Report 841. Development of Crash Modification Factors
- FHWA: Proven Safety Countermeasures