NCHRP 17-113 COUNTERMEASURES

Install Left-Turn Lane at Signalized Intersections

INTERSECTIONS

A raised median reduces opportunities for high-severity head-on and angle crashes, while additional through lanes can help reduce congestion-related rear-end crashes.

Implementation Strategy

How and Where to Apply

- Install left-turn lanes at signalized intersections with high volumes of left-turning vehicles, limited sight distance, or frequent left-turn-related crashes.
- Especially effective at intersections with high-speed approaches or where left-turning vehicles block through lanes, increasing rear-end and angle crash risk.
- Left-turn lanes can be added via roadway widening, median adjustments, or lane reallocation.

Use in a Safe System Approach

Installing left-turn lanes reduces conflict points and improves traffic flow, enhancing both operational and safety performance. It allows for physical and temporal separation of turning and through vehicles, lowering the chance of misjudged gaps and late decision-making, key principles of SSA.

Key Stakeholders

State DOTs, Intersection Designers, Traffic Engineers

Proactive Implementation

Proactively assess intersections for left-turn volumes, crash history, and available sight distance. Incorporate turn lane improvements during intersection upgrades, signal modernization, or corridor safety projects. Prioritize locations with older signals, limited space, or transitions from rural to urban settings.

Countermeasure Overview

Objective: Reduce frequency and severity of intersection conflicts through geometric improvements

Strategy: Provide/improve left-turn channelization

Targeted Solution

CONTRIBUTING FACTORS	▪ Inadequate Storage Capacity ▪ Poor Sight Distance
TARGET CRASH TYPE	▪ Left-turn
ROAD FACILITY TYPE	▪ Urban/suburban arterials ▪ Rural arterial
AREA TYPE	▪ All

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 1

Selected Related Countermeasures

- CM1 Advance intersection warning signs
- CM2 Retroreflective sheeting on signposts
- CM3 Wider stop bar markings

Cost: $ (moderate)

Service Life: 20 years

Dedicated left-turn lane. Source: highways.dot.gov

Safety Benefits

59% Introduction of left-turn lanes decrease rear-end crashes in all area types[1]

43% Reduces fatal, serious, minor, and possible injuries in all crash types[2]

[1] CMF ID: 8002
[2] CMF ID: 7999

Resources

- Development of Left-Turn Lane Guidelines for Signalized and Unsignalized Intersections
- Impacts of Safety of Left-Turn Treatment at High Speed Signalized Intersections