NCHRP 17-113 COUNTERMEASURES

Lane Departure Warning Systems (LDWS)

LDWS are in-vehicle technologies that detect unintended lane drifting using sensors or cameras and alert drivers through visual, audible, or haptic warnings.

Implementation Strategy

How and Where to Apply

- Integrated into new or existing vehicles, rather than fixed infrastructure, most effective on highways, rural roads, and high-speed arterials.
- Deployment is effective where run-off road and cross-median crahes are likely, supported by policies, consumer education, and integration with other driver assistance. technologies like Automatic Emergency Braking (AEB) and Adaptive Cruise Control (ACC).
- Ensuring well-maintained, visible lane markings on roadways is essential to maximize LDWS performance, as sensor detection depends on clear lane delineation.

Use in a Safe System Approach

LDWS support the SSA by warning drivers of unintended lane departures, helping prevent serious run-off-road and head-on crashes. They complement other vehicle safety systems to improve crash prevention.

Key Stakeholders

Transportation safety agencies and regulators, fleet operators, policy makers and legislators, roadway infrastructure agencies, vehicle manufacturers.

Proactive Implementation

Proactive implementation of LDWS involves encouraging widespread integration of these technologies. This includes promoting fleet adoption through incentives, enhancing driver awareness with education campaigns, and ensuring roadways have well-maintained lane markings to support sensor accuracy.

Countermeasure Overview

Objective: Keep vehicles from encroaching into opposite lane.

Strategy: Provide center two-way left-turn lanes for four- and two-lane roads.

Targeted Solution

CONTRIBUTING FACTORS	▪ Inadequate lane markings ▪ Driver Inattention ▪ Fatigue ▪ Speeding
TARGET CRASH TYPE	▪ Run-off-road ▪ Fixed object
ROAD FACILITY TYPE (ARTERIAL, COLLECTOR, LOCAL)	▪ N/A
AREA TYPE	▪ All

Safety Linkage

NCHRP 500 Series

Run-off Road

SAFE SYSTEM APPROACH

Safe Vehicles

AASHTO'S TOWARD ZERO DEATHS

Safer Vehicles

SAFE SYSTEM ROADWAY DESIGN

TIER 1
TIER 2
TIER 3
TIER 4

Tier 4

Selected Related Countermeasures

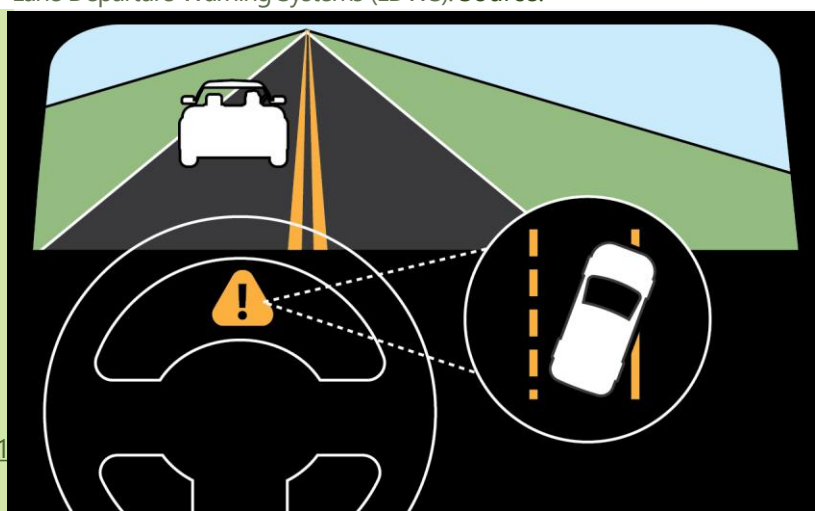
- CM1 Electronic Stability Control (ESC)
- CM2 Centerline Rumble Strips
- CM3 Edgeline Rumble Strips

Cost: $$ (Moderate)

Service Life: 5 years

Safety Benefits

Warns drivers when leaving lanes unintentionally, preventing run-off-road and sideswipe crashes.



Lane Departure Warning Systems (LDWS). Source:

Resources

- Benefit-cost Ratio
- FHWA-HRT-20-068, https://highways.dot.gov/media/2696
- FHWA-HRT-18-035, https://highways.dot.gov/media/34031
- [1]https://doi.org/10.1080/15389588.2016.1230672