NCHRP 17-113 COUNTERMEASURES

# Upgrade Existing Markings to Wet-Reflective Pavement Markings

ROADWAY DEPARTURE

Wet-reflective pavement markings enhances safety by improving driver visibility, particularly during nighttime or wet weather.

## Implementation Strategy

### How and Where to Apply

- Apply wet-reflective markings on roadways with high nighttime or wet-weather crash rate, particularly on curves, expressways, and multilane arterials.
- These markings contain special glass beads or optics that maintain retroreflectivity during rainfall, unlike standard markings that lose visibility when submerged.
- These markings should not be applied on low-volume facilities, short-duration pavements, steep drainage sections, or in contexts where material costs exceed anticipated safety benefits.

### Use in a Safe System Approach

By addressing reduced visibility in poor weather and at night, this countermeasure provides an additional safeguard for drivers, allowing more time to recognize road edges and curves, particularly on higher-speed roads. It compensates for momentary driver lapses and supports proactive crash avoidance.

### Key Stakeholders

State DOTs, MPOs, engineering consultants, safety advocacy groups.

### Proactive Implementation

Prioritize corridors with high-speed freeways, arterials, and multilane corridors with wet-weather crash risks, ensuring visibility during nighttime rain. Applying these treatments on durable pavements maximizes cost-effectiveness, enhances safety, and supports proactive roadway management. Prioritizing segments with documented crash history and low retroreflectivity ensures measurable safety gains.

## Countermeasure Overview

**Objective:** Keep vehicles from encroaching on the roadside.
**Strategy:** Provide enhanced pavement markings.

## Targeted Solution

| | |
|---|---|
| CONTRIBUTING FACTORS | ▪ Reduced visibility<br>▪ Driver inattention/ distraction |
| TARGET CRASH TYPE | ▪ Run-off Road<br>▪ Head-on |
| ROAD FACILITY TYPE | ▪ Principal Arterial<br>▪ Freeways<br>▪ Expressways |
| AREA TYPE | ▪ All |

## Safety Linkage

| | |
|---|---|
| NCHRP 500 Series | SAFE SYSTEM APPROACH |
| Run-off Road | Safe Roads |
| AASHTO'S TOWARD ZERO DEATHS | SAFE SYSTEM ROADWAY DESIGN |
| Safer Infrastructure | TIER 1<br>TIER 2<br>TIER 3<br>TIER 4<br>Tier 4 |

## Selected Related Countermeasures

- CM1 Centerline and shoulder rumble strips
- CM2 High-friction surface treatments
- CM3 Enhanced signage on curves

**Cost:** $ (Low)
**Service Life:** 5 years
**Benefit-Cost Ratio:** 1.5:1 to 7.7:1

Wet-reflective Markings. Source: FHWA.

## Safety Benefits

**41%** Reduces all type of crashes and K, A, B, C severities on multi lane roads (CMF ID: 8110)

**12%** Reduces crashes for all types and K, A, B, C severities on principle arterial- other freeways and expressways (CMF ID: 8134)

### Resources

- Comparison of Wet Reflective Elements with Tape – A Pavement Marking Study Based on Field Measurements
- Assessment of the Durability of Wet Night Visible Pavement Markings