NCHRP 17-113 COUNTERMEASURES

ROADWAY DEPARTURE

Install W-beam Guardrail

W-Beam guardrails prevent vehicles from leaving the roadway near hazardous areas like slopes, embankments, fixed objects, or drop-offs

Implementation Strategy

How and Where to Apply

- Install on roads with steep slopes, drop-offs, or fixed objects near travel lanes to prevent severe crash outcomes.
- Apply in rural, high-speed areas where clear zones are limited and roadside hazards pose significant risk to errant vehicles.
- The **FHWA** states "Run-off-road crashes account for over 50 percent of all traffic fatalities. Installing roadside barriers like W-beam guardrails can significantly reduce the severity of these crashes."

Use in a Safe System Approach

W-Beam guardrails serve as forgiving infrastructure by minimizing crash severity when drivers make mistakes. Strategically placing them along high-risk road segments, especially in rural or high-speed zones, helps protect all users, reduces fatal run-off-road incidents, and supports system-wide resilience by addressing human error without relying solely on behavior change.

Key Stakeholders

State Departments of Transportation (DOTs), Federal Highway Administration (FHWA), Roadway Design Engineers

Proactive Implementation

Identifying high-risk roadside areas through crash data and assessments allows early installation of W-Beam guardrails. This preventive strategy ensures safety features are integrated during road upgrades or construction, helping to reduce run-off-road crashes and protect motorists from impacts with embankments, fixed objects, or other roadside hazards.

Countermeasure Overview

Objective: Reduce the severity of the crash.

Strategy: Improve design and application of barrier and attenuation systems.

Targeted Solution

CONTRIBUTING FACTORS	▪ High Speed ▪ Reduced visibility ▪ Driver Inattention/ Distraction
TARGET CRASH TYPE	▪ Run-off road ▪ Head-on
ROAD FACILITY TYPE (ARTERIAL, COLLECTOR, LOCAL)	▪ Principal Arterial ▪ Freeways, expressways
AREA TYPE	▪ All

Safety Linkage

NCHRP 500	SAFE SYSTEM APPROACH
Run-off Road	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 Concrete Barriers
- CM2 Cable Median Barriers
- CM3 Clear Zone Improvements

Cost: Moderate to High

Service Life: 25 years

Benefit-Cost Ratio: N/A

Street Lighting . Source: eco ledmart

Safety Benefits

47% Reduces fatal and serious injury nighttime run-off-road crashes on freeways and expressways. [1]

16% Reduce fatal and injury crashes [2]

[1]CMF ID: 8423
[2]CMF ID: 8393

Resources

- FHWA Guardrail Resources
- Roadside Design Guide, AASHTO
- Manual for Assessing Safety Hardware (MASH), AASHTO (2016)