NCHRP 17-113 COUNTERMEASURES

Install W-beam Guardrail or Concrete Barrier

ROADWAY DEPARTURE

Installing W-beam guardrails or concrete barriers is a roadside safety countermeasure designed to shield motorists from fixed objects, steep slopes, drop-offs, or other roadside hazards.

Implementation Strategy

How and Where to Apply

- Apply on road segments with steep slopes, bridge ends, or fixed roadside hazards where clear recovery zones are insufficient and vehicle departure risks are high.
- Install using AASHTO MASH standards, selecting W-beam where deflection space is available and concrete barriers in high-speed, narrow, or high-impact zones for effective containment.
- The **FHWA** states "Guardrails are not designed to stop a vehicle, but to redirect it away from a hazard in a controlled manner"

Use in a Safe System Approach

W-beam guardrails and concrete barriers enhance roadside safety by preventing vehicles from striking hazardous features. They reduce crash severity by redirecting errant vehicles, making roads more forgiving of human error. These systems support survivable crashes and protect motorists, especially in high-risk roadside environments..

Key Stakeholders

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

Proactive Implementation

Proactive implementation involves identifying high-risk roadside locations through crash data and roadway assessments, then installing W-beam or concrete barriers before severe incidents occur. It emphasizes prevention by integrating safety hardware into road upgrades, ensuring consistent application, and maintaining standards to protect motorists from run-off-road and fixed-object crash 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	▪ Cross-median
ROAD FACILITY TYPE	▪ 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
Safer Infrastructure	Tier 1

Source: State Smart Transportation Initiative

Selected Related Countermeasures

- CM1 Clear Zone Management
- CM2 Crash Cushions (Impact Attenuators)
- CM3 Breakaway Support Structures

Cost: Moderate to High

Service Life: 25 years

Benefit-Cost Ratio: N/A

Safety Benefits

18% Reduce crashes for all types roads [1]

40% Reduces fatal and injury nighttime run-off-road crashes.[2]

[1] CMF ID: 8346
[2] CMF ID: 8376

Resources

- AASHTO. Roadside Design Guide, 4th Edition, 2011.
- FHWA. Roadway Widths and Lane Configurations on Urban Streets