Cable Barriers

Many States are installing cable median barriers in locations where there is a high potential for crossover crashes. Studies in Washington State and North Carolina have shown substantial reduction in fatal and injury crashes compared to other types of median barriers. The FHWA recommends that States review median crossover crash histories to identify locations where median barriers may benefit safety, and consider use of cable median barriers where appropriate.

Design Standard and Placement Considerations

Suitable for use on flat or moderately sloped terrain, cable barriers deflect laterally to absorb collision forces and reduce the impact on vehicle occupants. Installation costs are relatively inexpensive compared to concrete and metal beam barriers, and repair and maintenance costs can be offset by safety benefits.

Source: Brifen USA, Inc.

Cable barriers are ideal for retrofit application on existing median areas. Median crossover crashes tend to be severe, and median encroachments are likely to increase with higher traffic volumes. In the 2006 AASHTO *Roadside Design Guide*, chapter 6 update, the warrants for median barriers were revised to encourage use of barriers in medians of up to 50 feet wide. Most States that have installed cable median barriers report a decrease in cross-median crash fatalities of 90 percent or more. [M.H. Ray for Washington State DOT, 2007]

Appropriate barrier selection and placement are critical to crash performance. Some key design considerations for cable barriers are discussed below.

- ***Number of Cables:*** Research by the National Crash Analysis Center (NCAC) found that adding a fourth cable to the generic three-cable design increases the likelihood that the cable barrier will catch a broader spectrum of vehicles.[1]
- ***Post Spacing:*** Cable barrier systems have been tested and accepted with post spacing ranging from 6.5 to 32.4 ft. In general, deflection distance is known to increase with longer spacing between posts. What is not known, but strongly suspected, is whether longer post spacing may also affect the propensity for vehicles to penetrate the cable barrier. The conventional range for cable post spacing is 6.5 to 15 ft.
- ***Tensioning***: Tensioning the cables after installation improves the performance of the system by reducing deflection and increasing the potential to capture the impacting vehicle. The installation temperature is also a critical factor. Highway agencies should specify a minimum tension at a discreet installation temperature, and plan follow-up inspections to ensure the desired tension is maintained.

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1 "Performance Evaluation of Low-Tension, Three-Strand Cable Median Barriers on Sloped Terrains," prepared by NCAC under contract to the FHWA, April 2007.

- ***Cable Pre-Stretch:*** Pre-stretched cables have advantages, including reduced dynamic deflection by reducing the "play" between the individual wire strands and the bundle that forms the cable prior to installation.

- ***Slope Placement:*** The effectiveness of a cable barrier system is influenced by its placement on the side slope and the directions from which it can be hit. Agencies should review research recommendations regarding slope placement.[2] Except when located in median ditches, cable barriers may be placed anywhere on slopes 1:6 or flatter. Median placement must consider that vehicles that have already crossed a ditch may be able to slip under the lowest cable.

Source: FHWA

- ***Placement on Horizontal Curves:*** Cable barriers on the inside of horizontal curves can be expected to have increased deflection. Reducing the post spacing may be an effective countermeasure, but objective criteria have not been established. High tensioned cable systems should be considered for severe curvilinear alignments.

- ***Soil Conditions/Footing Design:*** Quality control of the footing concrete and reinforcement can be critical. The barrier performance may be slightly affected if footings pull out of the soil upon impact. However, the benefit of the extra cost of footings is lost if they have to be replaced after an impact and must be taken into account for cost comparison for the lifespan of the barrier.

Agencies should carefully review the FHWA acceptance letters on cable barriers systems for conditions and cautions that they should consider when designing roadside features. The AASHTO Roadside Design Guide is also a source of information that designers should use to help select and design barrier installations.

2 "Analyses of Placement Effects on Cable Barrier Systems for Varying Median Cross Sections," prepared by NCAC under contract to the FHWA, June 2007.

For More Information

AASHTO's Technology Implementation Group Cable Median Barriers Website:
http://tig.transportation.org/?siteid=57&pageid=2197
AASHTO-AGC-ARTBA *Online Barrier Hardware Guide*: **http://aashtotf13.tamu.edu/**
FHWA Crash Test Acceptance Letters for Longitudinal Barriers:
http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/barriers/
FHWA Corporate and Research Technology Web Site on Cable Barriers:
http://www.fhwa.dot.gov/crt/lifecycle/cable.cfm
FHWA Information Memorandum: Cable Barrier Considerations. July 20, 2007:
http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/policy_memo/memo072007/index.cfm
Roadside Design Guide, AASHTO, 2006: **https://bookstore.transportation.org/Item_details.aspx?id=148**

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