Cable Barriers
A National Perspective

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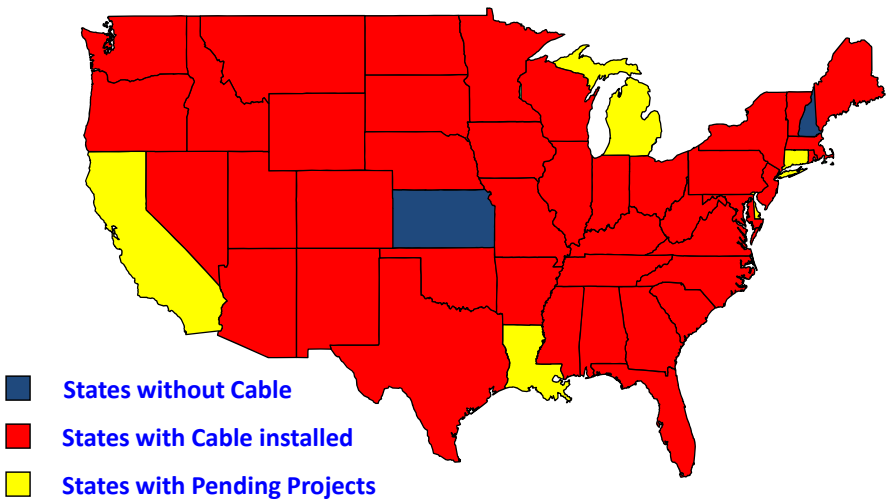
PEOPLE MOVING PEOPLE

Cable Median Barrier Status



Missouri cuts crossover deaths by 96%

Median guard cable installed on the state's busiest highways is credited with slashing crossover fatalities from 55 in 2006 to just two last year.

"We expected the cables to improve safety numbers, but seeing these results wan an unexpected thrill," says Missouri DOT Director Pete Rahn. "In just the first year after this safety improvement, 53 more people are safe at home with their families."

May 2008 **PublicWorks**

Cable on I-70 in MO.

Low Tension Cable Compensators

5

Low Tension Cable After a Hit

6

High Tension Cable After A Hit

Saving lives and saving dollars

Florida DOT implements various measures, such as high-tension barrier systems, to mitigate accidents

May 2008 **ROADS & BRIDGES**

Cable Barriers In Florida

23 mi. in median of I-75, Manatee, Sarasota & Charlotte Counties

Cable Barriers In Florida

2005 pilot project - 6 miles in Turnpike median Miami area

Cable Barriers In Florida

5 miles in median of I-275, Hillsborough Co.

Cable Barriers In Florida

25 miles in median of I-4, Polk County

Cable Barriers In Florida

53 miles Turnpike canal protection in Miami-Dade, Palm Beach & St. Lucie Counties

Cable Barriers In Florida

11 miles on the Beachline in Orange County (OOCEA)

Cable Barrier Features

- Aesthetic
- Low initial cost
- Ease of repair
- Ease of inspection
- Some secondary capacity
- No “Back” side
- Low occupant risk/longer deflections

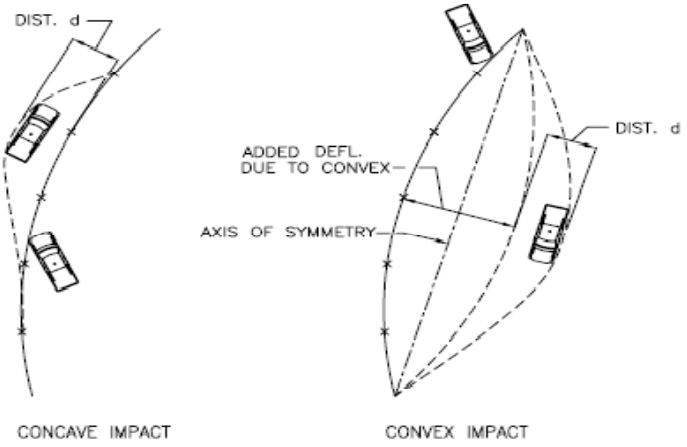
The percentage of median crashes that result in injury or death are significantly lower for cable (16%) than for concrete barrier (41%) or W-beam guardrail (41%).

Washington State
Department of Transportation

Cable Barrier Issues

- Lateral placement
- On slopes
  - how much slope and where can we put it
- Cable and post interaction connection strength
- Post spacing and effect on performance
- Sources of tension loss
- Vertical alignment (Under-ride)
- Horizontal curvature (inside/outside)

Cables on Curves



NCHRP 20-07(210) Guidelines For Selection of Cable Barrier Systems

Cable Barrier Issues

- Cable heights (top/bottom and tolerance)
- Soil, footings, post embedment
- Installation length between anchors
- Small car on TL-4 (top cable may be a problem – may need more cables)
- Higher encroachment angles (may likely exceed capacity)
- Others?

Cable Testing

- No test procedure for cable in NCHRP 350
  - Common practice was to use longitudinal barrier tests:
    - 820C 20 deg. 100 kph (60 mph)
    - 2000P 25 deg. 100 kph
  - No guidance on length of test section
    - Range from 200 – 912 feet
    - Most test were 300 – 350 feet
  - No guidance on critical impact point for cable barriers

Cable Testing

- Testing provisions in MASH 08 (update to NCHRP 350)
  - Does not specify a critical impact point for cable barriers
  - Does specify minimum test length of 600 feet
  - Tension for temperature of 100 deg. F
  - Suggests using largest recommended post spacing (deflections for closer post spacing may be estimated or interpolated)

Critical Impact Point

Are there critical impact points for cable barrier?

- Impact at or just upstream of post
  - Increased opportunity to push cables down and reduce cable height prior to engagement with vehicle
  - More override potential
- Impact near midspan
  - More propensity for underride
- Incorporate cable splice or turnbuckle within impact region

Barrier Length

Is the new length appropriate?

- Installation length influences lateral deflection
- Test houses can accommodate extra length
- Improvement upon Report 350 testing
- Longer lengths may be needed
  - Review and/or conduct additional research & testing
  - Determine relationship between length & deflection
  - Use 600-ft length until need for longer installations established
  - Perhaps develop safety factor to compute design deflection from test deflection

Tension Requirements

Is this tension requirement appropriate?

- Higher temperature → lower tension → greater deflection
- Approach is practical
- Should be based on cable rather than ambient temperature
  - Cable temperature can be much greater than ambient temperature
- Manufacturers can adjust tension tables for lower or higher temperature regions
- Should 820C be tested at extreme low temperature?
  - Europe specifies high temperature for large vehicle (deflection) and low temperature for small vehicle (occupant risk)

Post Spacing

Is this requirement appropriate?

- Largest post spacing
  - Provides greatest max. deflection
  - Provides increased opportunity for penetration
  - Provides lowest occupant risk
- Shortest post spacing
  - Provides highest occupant risk
  - Provides increased propensity for vehicle instability
- Consensus to eliminate reference to post spacing
  - Acceptable post spacings and associated deflections determined through testing
  - Interpolation of deflection acceptable between tested post spacings

Current NCHRP Cable Research

- Project 22-22 “Placement of Traffic Barriers on Roadside and Median Slopes”
- Project 22-25 “Guidelines for the Selection, Use and Maintenance of Cable Barrier Systems”

FY 2009 Approved NCHRP

- 17-44 – Investigation of Contributing Factors Associated with Cross-Median Crashes and Identification of Appropriate Countermeasures
- 22-26 – Identification of Factors Related to Serious Injuries in Crashes of Motorcyclists into Traffic Barriers
- 22-27 – Update of Roadside Safety Analysis Program (RSAP) Software and Default Data Elements

Possible Future Research

- Cable heights/spacing
- Post spacing and deflection
- Soil considerations
- Slope rounding needs
- Methodology for design of anchors
- Cable Characteristics
- Optimum cable design
- Operational life
  - How many impacts?
  - Inspection procedures
- Curvatures and deflections
- Curbs and drainage with cable barriers

QUESTIONS OR COMMENTS?