Session 15

Andy Keel

FL. Dept. of Transportation

Cable Barrier Use on the FDOT System

Topic Description

This topic will cover High Tension Cable Barrier systems and will focus primarily on their use as median barriers. Included will be a basic description of the systems, comparison to older type cable barriers, capabilities and characteristics of the systems and the use of these systems in Florida.

Speaker Biography

Andy has spent more than 32 years with FDOT and has more than 38 years total experience in the design and construction of highways. He is currently responsible for overall management, development and maintenance of the Department's Design Standards and for production of the Design Standards booklet. He has specific responsibility for development and updating Design Standards related to roadway design and roadside safety.

HIGH TENSION CABLE BARRIERS

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Do Cable Barriers Work?

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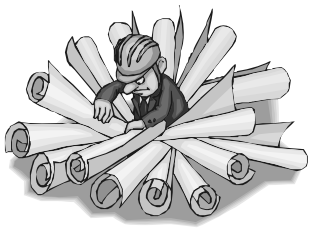
Do Cable Barriers Work?

DISCLAIMER

PREFERENCES

OUTLINE

- Why Median Barrier?
- Old vs. New
- High Tension Cable Barrier System
- Design Considerations
- Construction Sequence
- Maintenance
- Installation Cost
- Cable Barrier In Florida
- Things To Think About



Why Median Barrier ?

- Many Cross Median Crashes occur on medians greater than 30 feet wide
- 64 Ft. Median – 30° Angle – 70 mph
- Across Median Crashes 3x's more severe than other freeway crashes (NC98)
- WI Study- 53% of Cross Median Crashes resulted in personal injury & 7% involved a fatality

Why Median Barrier ?

- Median encroachments increase with higher traffic volumes
- Brevard Co. 1994-2001 – 123 fatal crashes. Almost 1/3 involved in median crossovers
- Crossover deaths may be under reported because of the way reporting officers record the incidents on crash reports

Why Median Barrier ?

Florida's Turnpike Median Crash Data

SR 91	2001	2002	2003	2004	2005
Fatal Crossover Crashes	12	17	26	25	4
Fatalities	18	21	34	46	4

Median Barrier Options Available

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Median Barrier Options Available

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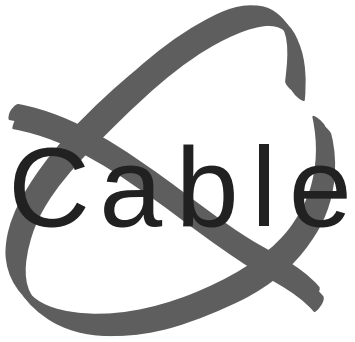
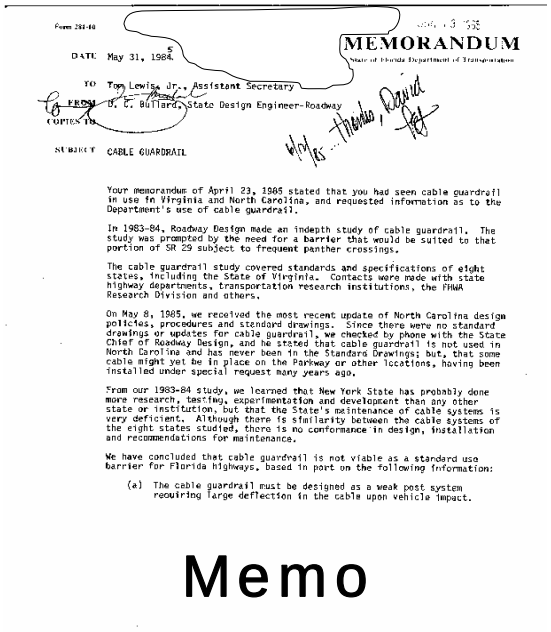
Median Barrier Options Available

“We Don’t Do Cable”





MEMORANDUM

DATE May 31, 1984

TO Tom Lewis, Jr., Assistant Secretary

FROM D. C. Bullard, State Design Engineer-Roadway

COPIES TO

SUBJECT CABLE GUARDRAIL

Your memorandum of April 23, 1985 stated that you had seen cable guardrail in use in Virginia and North Carolina, and requested information as to the Department's use of cable guardrail.

In 1983-84, Roadway Design made an indepth study of cable guardrail. The study was prompted by the need for a barrier that would be suited to that portion of SR 29 subject to frequent panther crossings.

The cable guardrail study covered standards and specifications of eight states, including the State of Virginia. Contacts were made with state highway departments, transportation research institutions, the FHWA Research Division and others.

On May 8, 1985, we received the most recent update of North Carolina design policies, procedures and standard drawings. Since there were no standard drawings or updates for cable guardrail, we checked by phone with the State Chief of Roadway Design, and he stated that cable guardrail is not used in North Carolina and has never been in the Standard Drawings; but, that some cable might yet be in place on the Parkway or other locations, having been installed under special request many years ago.

From our 1983-84 study, we learned that New York State has probably done more research, testing, experimentation and development than any other state or institution, but that the State's maintenance of cable systems is very deficient. Although there is similarity between the cable systems of the eight states studied, there is no conformance in design, installation and recommendations for maintenance.

We have concluded that cable guardrail is not viable as a standard use barrier for Florida highways, based in part on the following information:

(a) The cable guardrail must be designed as a weak post system requiring large deflection in the cable upon vehicle impact.

Memo

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US Cable

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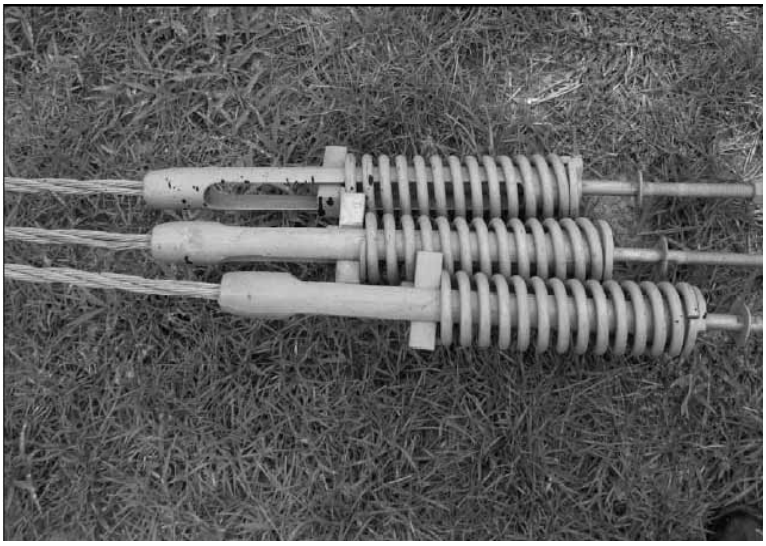
US Cable



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US Cable After Hit

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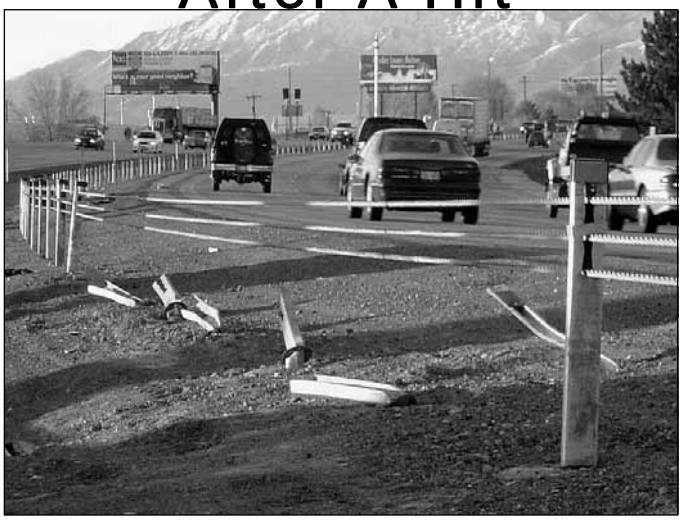
High Tension Cable After A Hit



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Basic Segments Of Cable Barrier System

- End Anchors
- Transition Sections
- Basic Length of Need Section

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End Anchors

- Deadman Type
- Crashworthy
- Guardrail

Deadman Type

Crashworthy

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Guardrail

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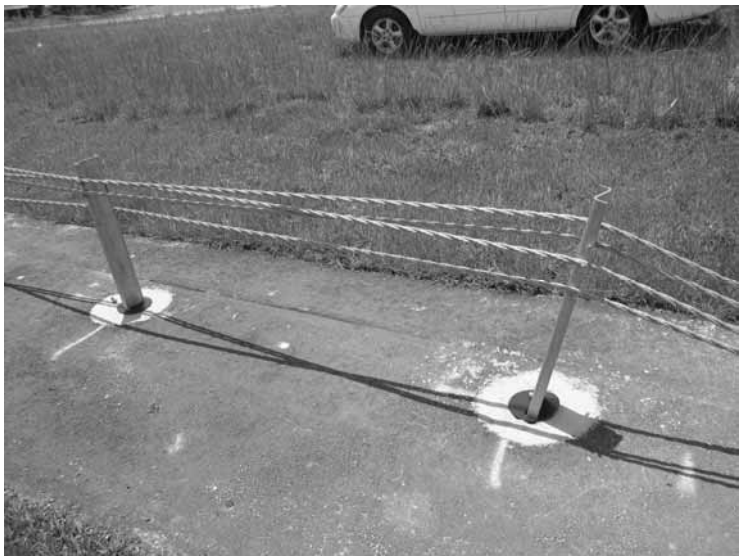
Transition Section



Basic Length of Need Section

- Brifen
- CASS by Trinity
- Gibraltar
- Nucor Marion
- Safence

Brifen

CASS

Gibraltar

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Nucor Marion

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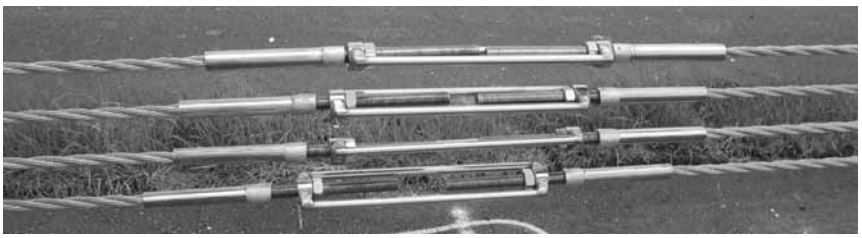
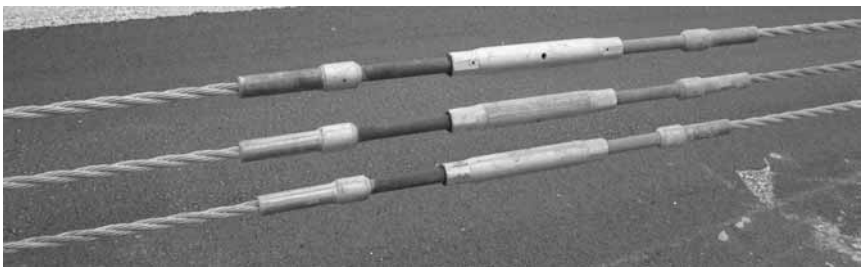
Safence

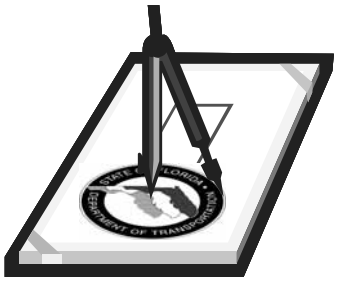
Tension Adjustment





Design Considerations

- Location
- Deflection Space
- Type Anchors
- Post Footings



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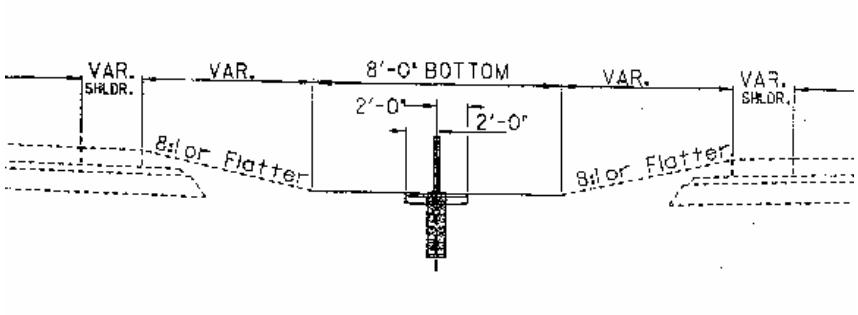
Design Consideration

- Location- Center Line Of Median



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Design Consideration

- Location- Shoulder

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Design Consideration

- Location – Slope

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Design Consideration

- Location – Slope

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Design Consideration

- Location – Slope

1 ft. Offset

4 ft. Offset

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Design Considerations

- Deflection – Controlled by Post Spacing

Deflection	Post Spacing
9'3"	30.FT
9'	28.FT
8'	20.FT
7'	12.FT

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Design Consideration

- Deflection – Also affected by angle & speed

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Design Considerations

Type Anchors

- Deadman
- Crashworthy
- Guardrail Connection

Design Considerations

Post Footings

Driven

Concrete With Sockets

Construction Sequence

Prepare Ground

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Construction Sequence

Misc. Asphalt Placed

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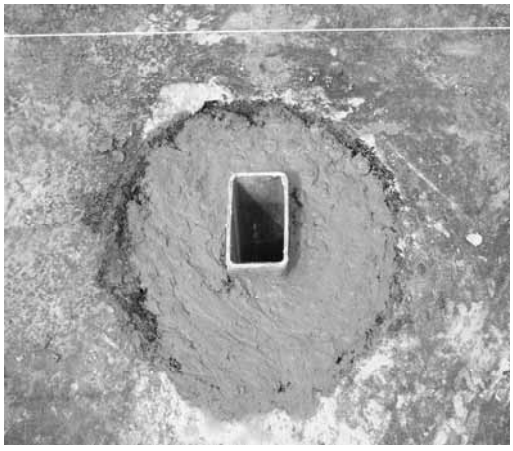
Construction Sequence

Holes Drilled & Sockets Installed



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Construction Sequence

Posts Installed and Cable Strung

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Construction Sequence

Cable Tensioned

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Maintenance

- Remove Damaged Posts
- Insert New Posts In Sockets
- Re-attach Cable

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Maintenance Video

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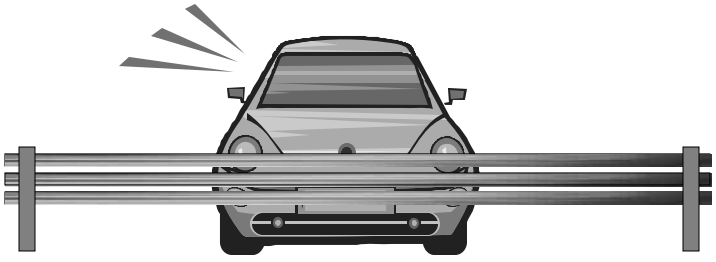
Maintenance

Estimated Repair Time For A “Typical Hit”

Most States reporting 30-60 Minutes



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Installation Costs

Numbers Vary

$9 --- $19 LF

Anchors Included or separate?

Cable System Only?

Mowing Strip / Earthwork?

Maintenance Of Traffic?

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Installation Costs

Beachline Comparison

6.3 mi. Double Face Guardrail	$338,000 per mi.
11.1 mi. Cable Barrier	$209,000 per mi.
Savings:	$129,000 per mi.

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Cable Barrier In Florida

- HEFT
- District 7
- Turnpike Canals
- District 1

Developmental Specification

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Things To Think About

We Know:

Median barriers can significantly reduce Cross Median Crashes

Barrier selection & placement are critical for optimal performance

Cable barriers offer cost savings while meeting current test level requirements

High Tension Cable barriers can sustain hits and still remain effective

Number of incidents will increase, but severity will be significantly reduced

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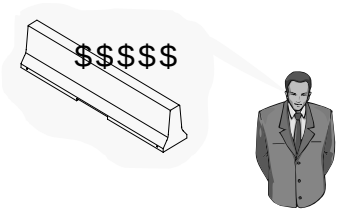
Things To Think About



We don't know:

What median width / ADT combinations result in cost-effective warrants

How median barriers (cable, w-beam, concrete) perform when struck by a vehicle coming UP a slope into the barrier

Life cycle cost

Performance in hits on convex side of horizontal curves

Performance in sag vertical curves

Life of the cables / long term performance of cables

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Things To Think About

Additional Issues:

- Ambient air vs. rope temperature
- Cable tension tolerances
- Best lateral placement
- Pre-stretched vs. non pre-stretched
- Field applied vs. factory applied fittings
- Others ??

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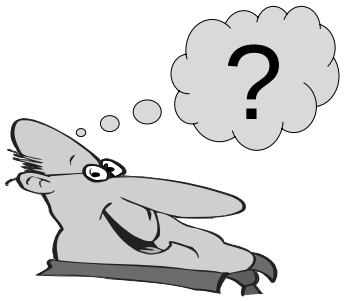
Things To Think About



<u>The future:</u>

Standardization?

Standardization of testing?

Standard specification?

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MP 7.8 SB 56+
04/19/2006
Repaired on 4/19/06


Snow At Concrete Barrier

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