

Cable Barrier for Emergency First Responders



Michigan Traffic & Safety Summit 2011
March 23, 2011

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Purpose of High Tension Cable Barrier Installation

- *Reducing frequency and severity of cross-median crashes in a safe, reliable, and economical manner*
- Cross-median crashes have severe and catastrophic consequences
 - Fatalities and severe injuries are the norm

Cross-Median Crash



Cross-Median Crash



Cross-Median Crash



Cross-Median Crash



Cross-Median Crash



Cross-Median Crash



Cross-Median Crash



Benefits of High Tension Cable Barrier

- Highly effective at capturing and redirecting impacting vehicles
 - Meets federally-mandated crash testing standards
 - Approximately 95% effective at capturing and redirecting impacting vehicles



Benefits of High Tension Cable Barrier

- Low Installation Cost
 - Cable Barrier: \$12 to \$15 per foot
 - Median Guardrail: \$28 to \$33 per foot
 - Concrete Barrier: \$80 per foot and more



Benefits of High Tension Cable Barrier

- Ease of Maintenance
 - Usually remains operative after a typical impact
 - Utilizes features that simplify repairs



Benefits of High Tension Cable Barrier

- May be installed on slopes that are too steep for other barrier types
 - Extensive re-grading and drainage structures usually are not required
 - Earthwork and drainage structures are very costly!!

Win-Win Condition

Low Installation Cost + Minor Re-Grading + No Drainage Structures

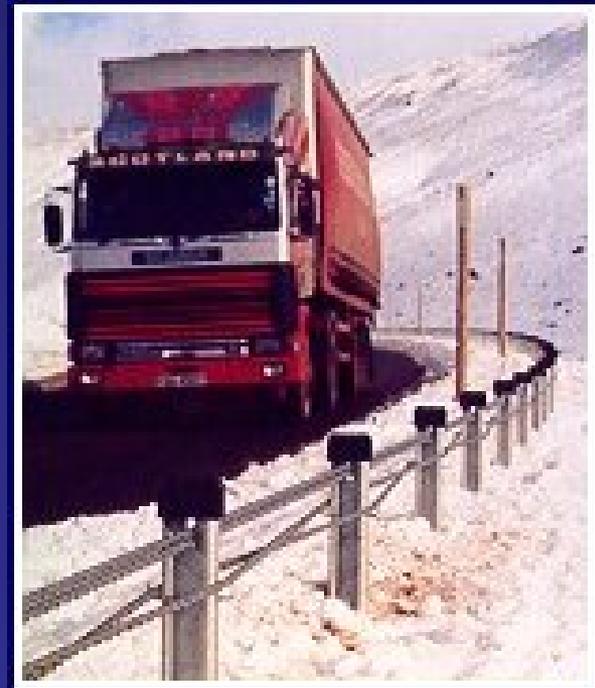
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Huge Savings!!!



History of High Tension Cable Barrier

- Developed in Europe in the 1980s
 - Great Britain
 - Sweden
- Used in Europe, Asia, and Australia before it was implemented in the U.S.

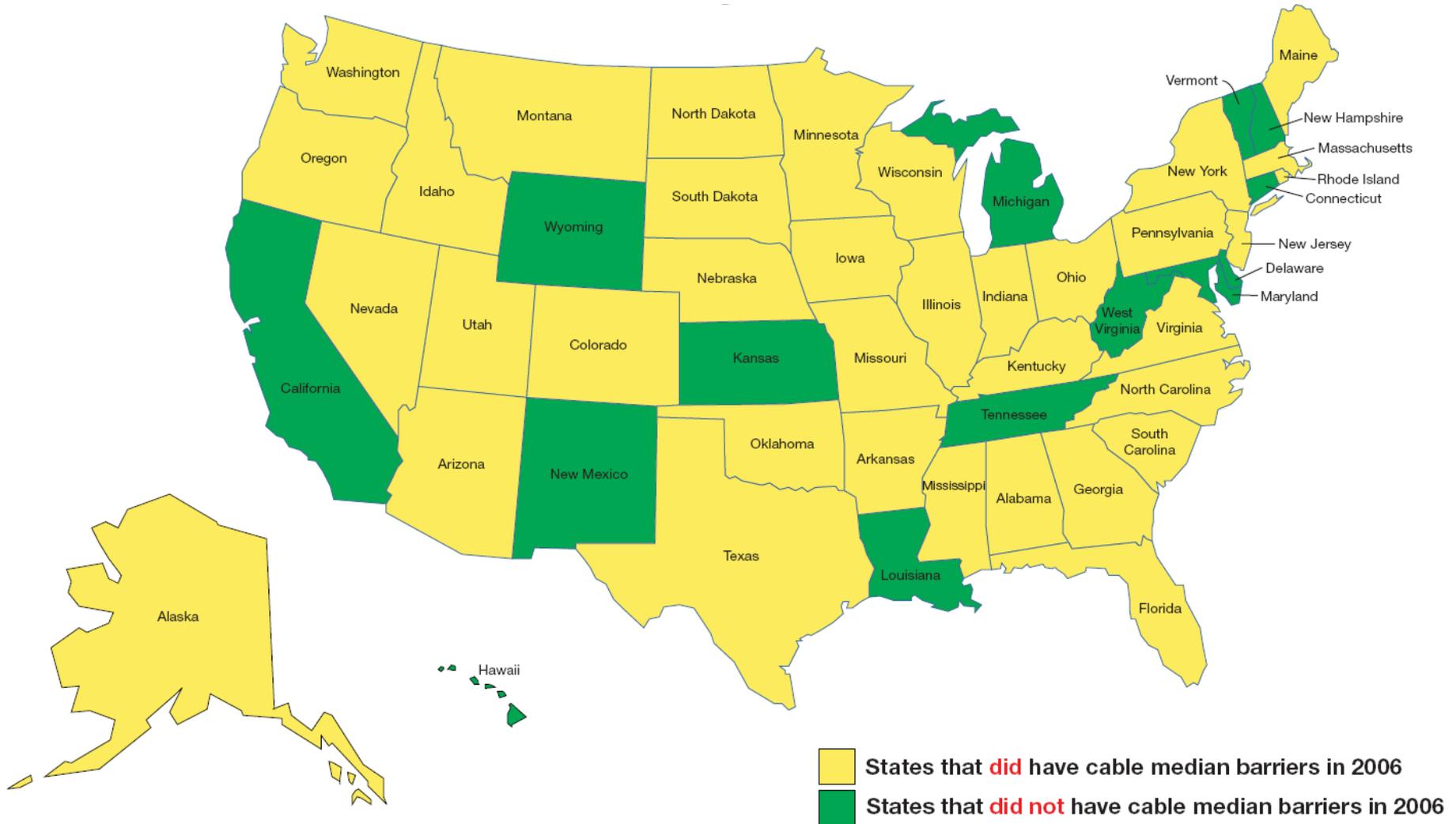


History of High Tension Cable Barrier

- Began to appear in the U.S. in the 1990s
 - Oklahoma
 - North Carolina
 - Ohio
 - Missouri
 - Texas
 - Minnesota
 - Utah
 - Washington
 - Many others!!



Cable Median Barrier Usage in 2006



Source: Washington State DOT

Cable Median Barrier Usage in 2008



Source: Washington State DOT

Cable Barrier Research By Other Transportation Agencies

Many Transportation Agencies from Other States and Countries Have Conducted Research Studies and In-Service Performance Evaluations

- MDOT reviewed cable barrier studies and in-service performance evaluations before installing cable barrier on Michigan roadways

States and Countries That Have Conducted Cable Barrier Research Studies and In-Service Performance Evaluations

- Indiana
- Oregon
- Ohio
- Washington State
- Wisconsin
- North Carolina
- New Zealand
- Many Others!!

Information from Other States

North Carolina

- Installed median barrier on 1,000 miles of freeway between the years 2000 and 2006
 - \$120 million dollar investment
 - 58 median barrier projects
 - Estimated 95 fatal cross-median crashes avoided
 - Estimated 145 lives saved

Ohio

- Before cable (July 2001 - June 2003):
 - 9 cross-over crashes (11 fatalities)
- After cable (July 2003 - June 2006):
 - No cross-over fatalities

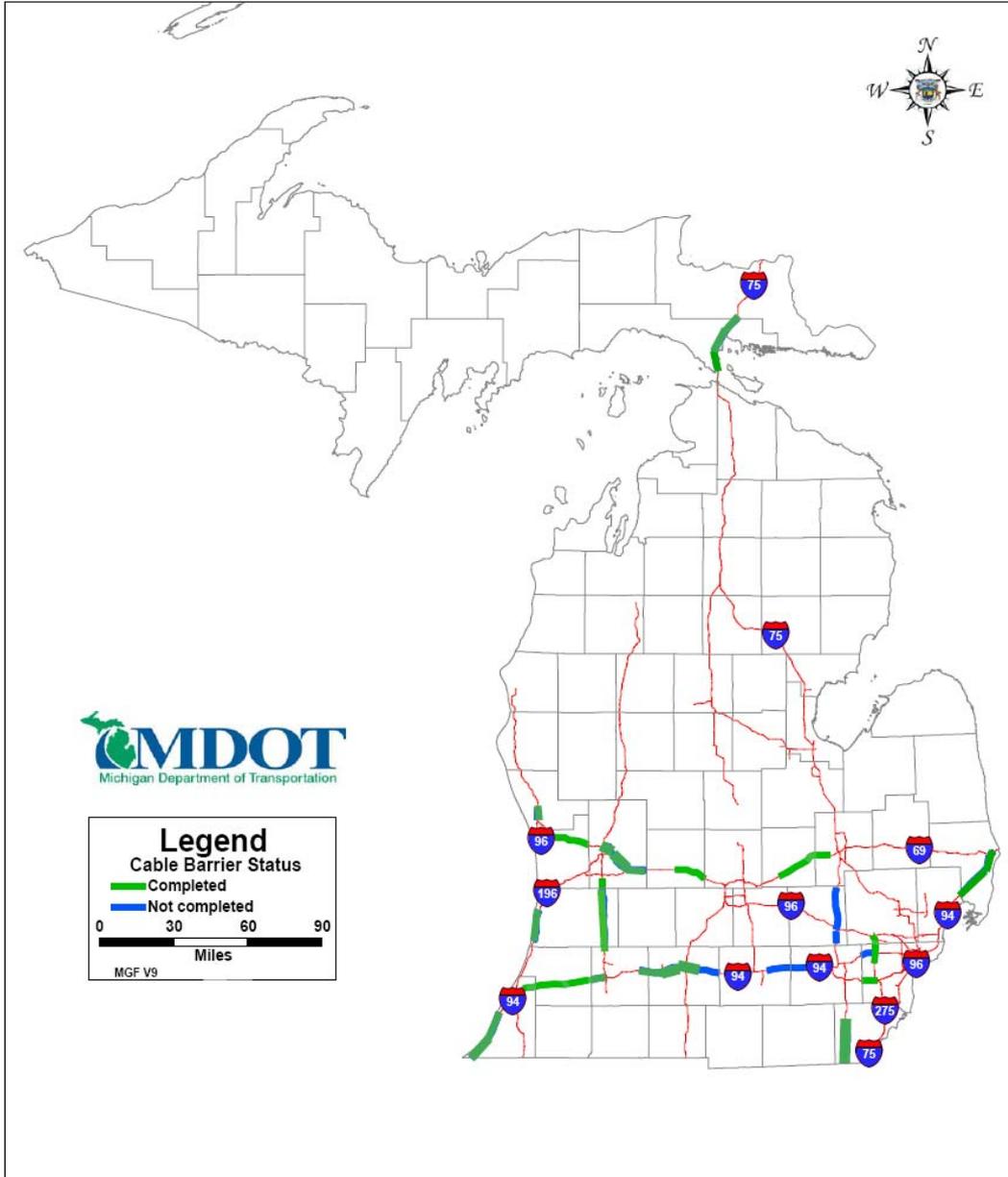
Michigan's Cable Barrier Initiative

- Purpose
 - Reduce frequency and severity of cross-median crashes on Michigan roadways
- Method
 - Target roadway sections with a history of cross-median crashes
 - Justify barrier installation based on cost-benefit analyses
- Scope of Initiative
 - Install 280 miles of median barrier over a three-year period
 - \$40 million investment
 - Construction began in 2008
- Goal
 - Save 13 lives and prevent 51 incapacitating injuries PER YEAR

Initial Results from Michigan's Cable Barrier Initiative

- Statewide Status (as of December 2010)
 - 252 miles of cable barrier have been installed
 - 28 miles of the original 280 miles of cable barrier scheduled for installation

Cable Barrier Program FY 2008-2013



Initial Results from Michigan's Cable Barrier Initiative

- The following observations have been made:
 - Reported increase in Property Damage Only Crashes
 - No reported fatalities (attributed to vehicles breaching the cable system and impacting opposing vehicles) in areas where cable barrier has been installed

Recent Crashes in Michigan

I-94 Berrien County - 01/09/09



Vehicle losing control



Vehicle lost control, traveled through the median, and impacted the cable barrier on the opposite side of the median.



Vehicle after it came to rest. Only a few posts were knocked out, but the cable barrier is still intact and operational.

Recent Crashes in Michigan

I-69 Genesee County - 01/13/09





Tractor-trailer traveled through the median and impacted the cable barrier on the opposite side of the median. Cable barrier captured the tractor-trailer and prevented it from entering the opposing traffic stream.



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Michigan's Proposed Cable Barrier Study

- MDOT plans on conducting a study of cable barrier on Michigan roadways
- Three-year study is slated to start October 2011 and end October 2014

Michigan's Proposed Cable Barrier Study

- Comprehensive study will examine many items
 - Overall effectiveness of cable barrier
 - Comparison of cable barrier to other barrier types
 - Overall statewide cost-benefit analysis of cable barrier
 - Adverse effects due to unusual regional weather patterns
 - Adverse effects on specific motoring groups (e.g., motorcyclists)
 - Adverse effects on Emergency First Responder operations
 - Several other items!!

High Tension Cable Barrier Five Systems Approved in Michigan



★ Each system is proprietary and has unique features

MDOT Approved High-Tension Cable Systems

Brifen Cable System

- Manufactured by Brifen USA, Inc. (Oklahoma City, OK)
- Originally developed in UK
- Some cables weave between posts
- Four-cable system is most common



MDOT Approved High-Tension Cable Systems

CASS Cable System

- Manufactured by Trinity Industries, Inc. (Girard, OH)
- Three cable system
- Cables are all in-line and travel through the web of each post



MDOT Approved High-Tension Cable Systems

Safence Cable System

- Manufactured by Safence, Inc.
- Originally developed in Sweden
- Company manufactures both three cable and four cable systems
- Cables are all in-line and travel through the web of each post



MDOT Approved High-Tension Cable Systems

Gibraltar Cable System

- Manufactured by Gibraltar, LLC (Burnet, TX)
- Company manufactures both three cable and four cable systems
- Utilizes a “hairpin” to support cables
- Cables are straight, but posts alternate from side to side



MDOT Approved High-Tension Cable Systems

NuCable System

- Manufactured by Nucor Steel Marion, Inc. (Marion, OH)
- Utilizes RIB-BAK[®] U-Channel steel posts
- Cables attach to posts with locking hook bolts, hangers, and clips



Working With Cable Barrier



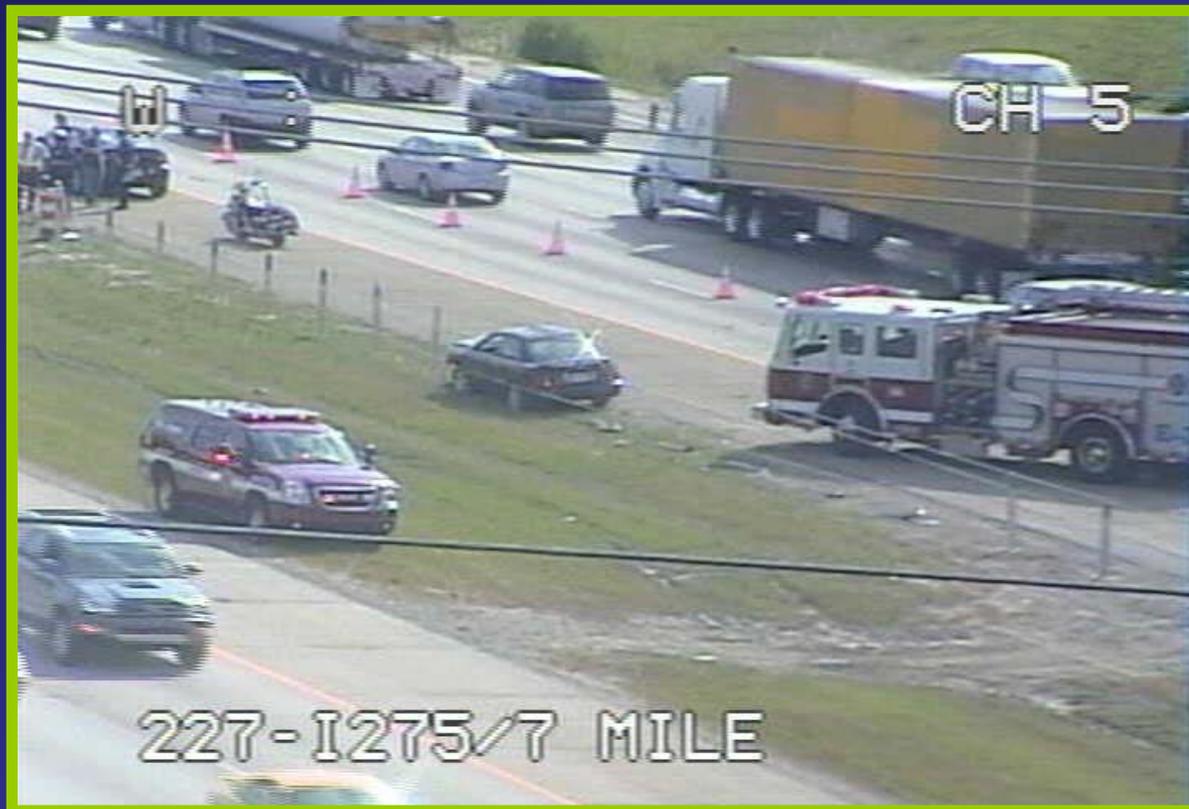
Working With Cable Barrier

- Remember: **Safety First!**
- Typically no lane closures are necessary to retrieve a vehicle
- Heavy equipment or special tools usually are not required
- Cable can be laid down and driven over in emergency situations



Removing a Vehicle

- Try to remove the vehicle in the opposite way it entered the system



Removing Miscellaneous Hardware

- Removing miscellaneous hardware will usually create slack making the cable easier to work with



Hairpin on a Gibraltar System

Remember: MDOT Maintenance can help you release the tension on the system. Please contact your local MDOT Transportation Service Center for information.

Removing Posts

- Try removing posts to create slack in cables
 - If there is ice in the sockets, posts usually cannot be removed without melting the ice



Releasing Cable Tension

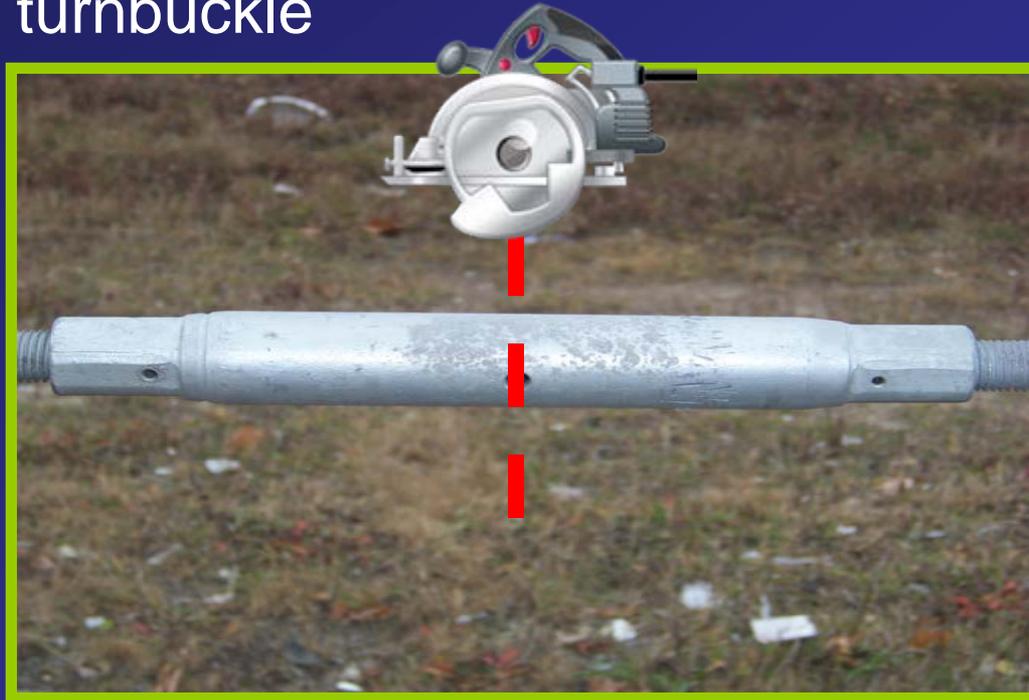
- Release cable tension by loosening turnbuckle(s)
 - **CAUTION:** If cable is under tension, never loosen turnbuckle past the inspection holes without proper equipment and experience



Note: Check both inspection holes while loosening turnbuckle

Cutting Turnbuckles

- A preferred alternative to cutting the cable is cutting the turnbuckle
 - Much easier and less costly to replace a turnbuckle



Hardware Interfering with Turnbuckle Removal

- Before cutting turnbuckle, it is desirable to remove adjacent posts in the vicinity of the turnbuckle



Loosen Turnbuckle Before Cutting

- Before cutting turnbuckle, loosen the turnbuckle until threaded terminal ends reach the inspection hole
 - Never loosen turnbuckle past the inspection holes without proper equipment and experience



Note: Check both inspection holes while loosening turnbuckle

Cut Turnbuckle In The Middle

- Always cut in the middle of the turnbuckle with a chop saw or similar device



Cutting Cables

Cut the Cable
ONLY AS A LAST RESORT



- Under life or death situations where time is critical
- When other alternatives for loosening cables are not feasible

Order of Preference Removing a Vehicle

1. Attempt to remove the vehicle by pulling the vehicle out of the cable barrier
2. Remove posts and/or hardware to loosen cables
3. Loosen turnbuckles to release cable tension (with certain limitations as noted earlier)
4. Cut turnbuckles as an alternative to cutting cables
5. Cut cables only as a last resort

Cutting the Cable

- If a cable must be cut, make sure all personnel (except the individual cutting the cable) are clear of the system

Cutting the Cable

- Cut the cable away from the impact area
 - Cut where cable system has not been affected by the impact and cables are not deflected



Be Careful Around Cable Barrier!!



Cutting the Cable

- The cable may react differently when cut based on the system



Cutting the Cable

- When cut, the entire cable run will be out of commission until repairs are made
 - Cable splicing may be required
 - Up to 1,000 feet of cable may need to be replaced



Videos Showing a Cable being Cut

- Video 1
 - Cut with a K-12 circular saw between two undamaged posts
- Video 2
 - Cut with a portable combi-cutter between two undamaged posts
- Video 3
 - Cut with a hydraulic cutter in an area without posts

MDOT Contacts

- Contact your local MDOT Transportation Service Center for guidance and on-site help at a crash scene
- Useful MDOT weblinks:
 - <http://www.michigan.gov/mdot>
 - <http://www.michigan.gov/cableguardrail>

Questions?

