

High Tension Cable Barrier

Operation and Maintenance



2019 Highway Maintenance Conference
May 1st, 2019

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High Tension Cable Barrier Systems Approved by MDOT



★ 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

- Manufactured by Trinity Industries, Inc. (Girard, OH)
- Three cable systems
 - Two versions in Michigan: *CASS TL-4* and *CASS 4-to-1*





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





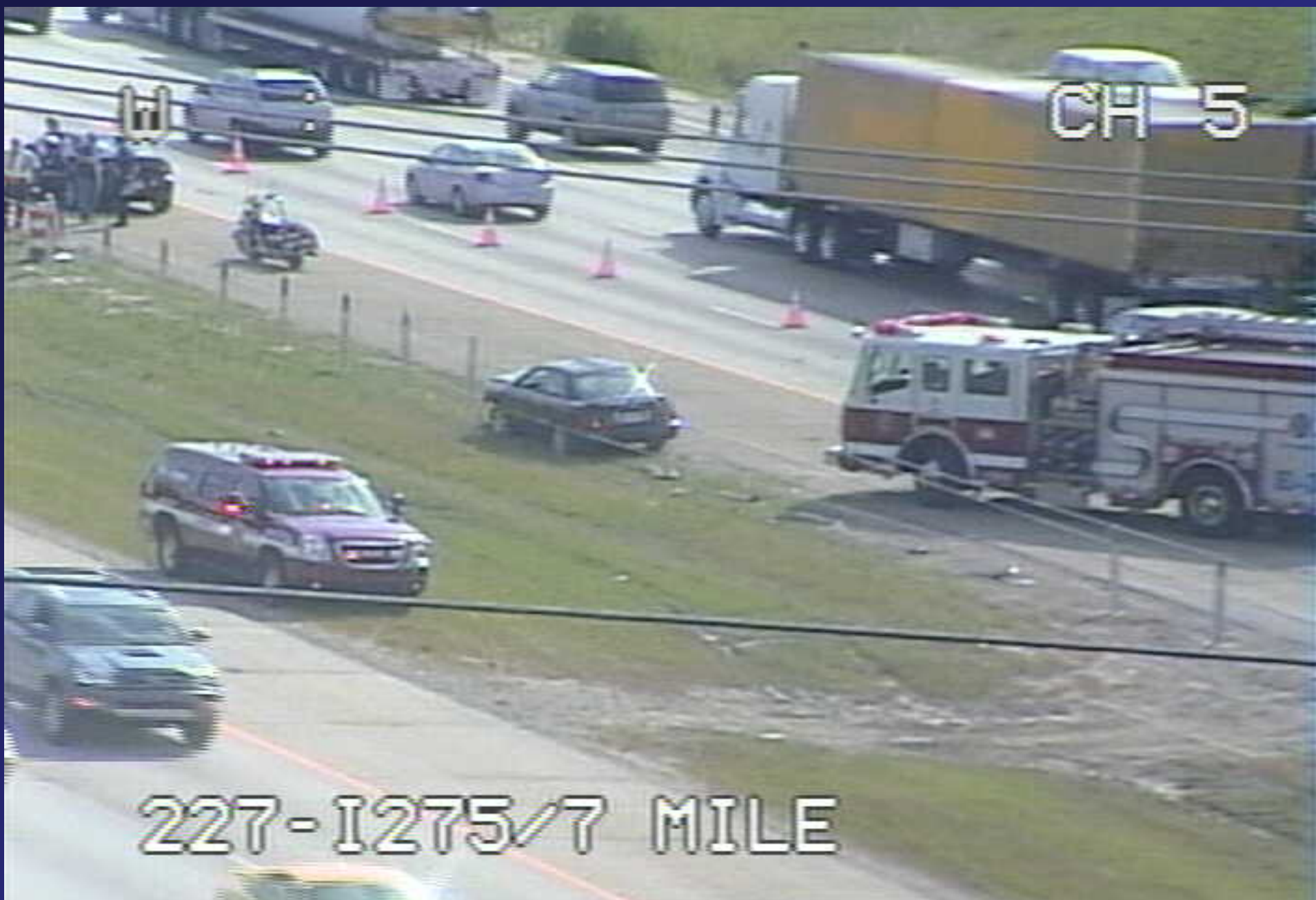
Cable Barrier Operation





CH 5

227-I275/7 MILE















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
 - a. Cable release post on Gibraltar system may be “tripped” in order to release cables from anchor post
3. Loosen turnbuckles to release cable tension (with certain limitations)
4. Cut turnbuckles as an alternative to cutting cables
5. Cut cables only as a last resort

Removing a Vehicle

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

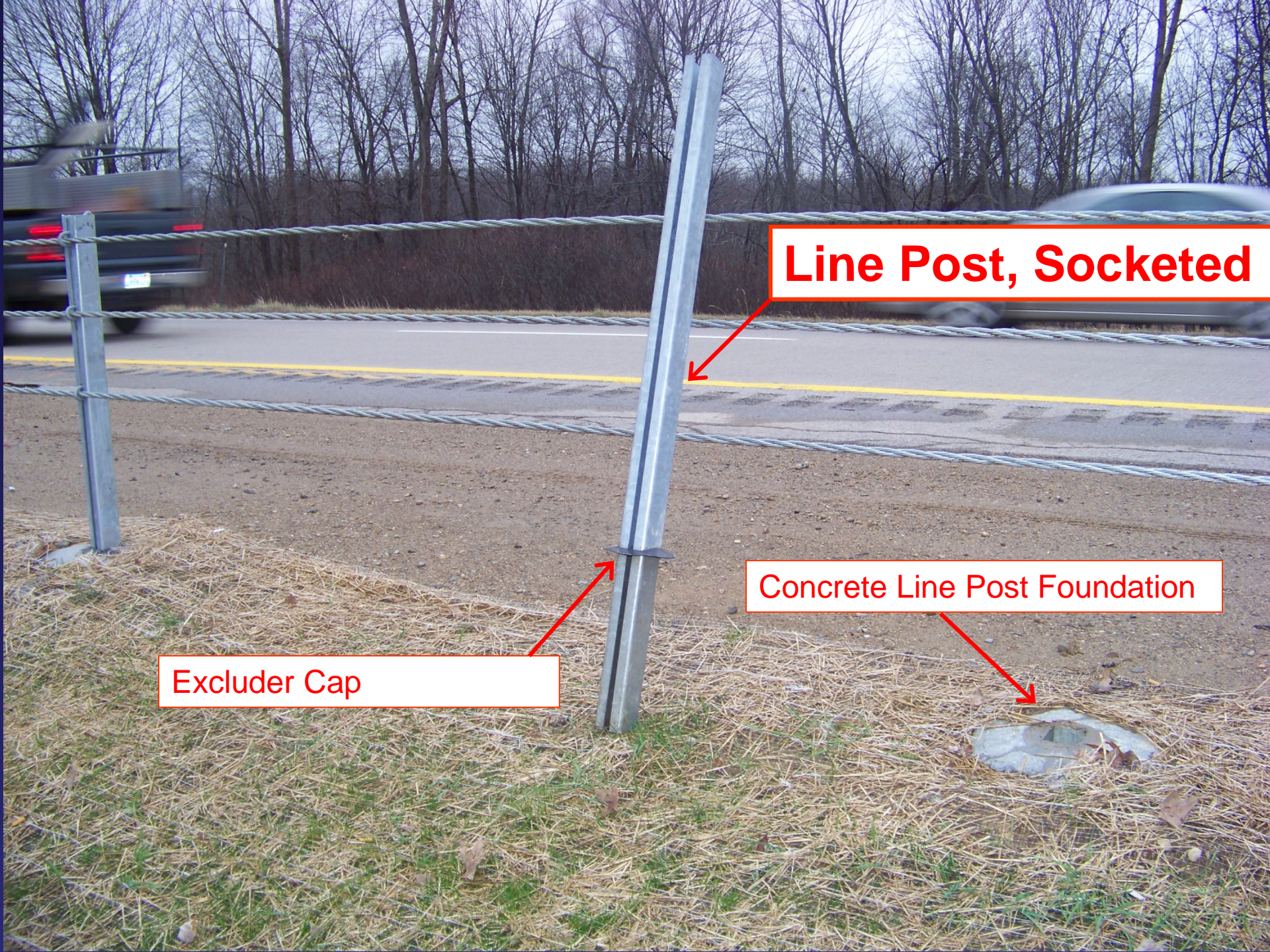


Removing Posts and Hardware

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



Hairpin on a Gibraltar System



Line Post, Socketed

Concrete Line Post Foundation

Excluder Cap

Removing a Post Encased in Ice

- If there is ice in the sockets, posts usually cannot be removed without melting the ice



Releasing Cable Tension by “Tripping” Cable Release Post

ONLY APPLIES TO GIBRALTAR HTCB SYSTEM!!

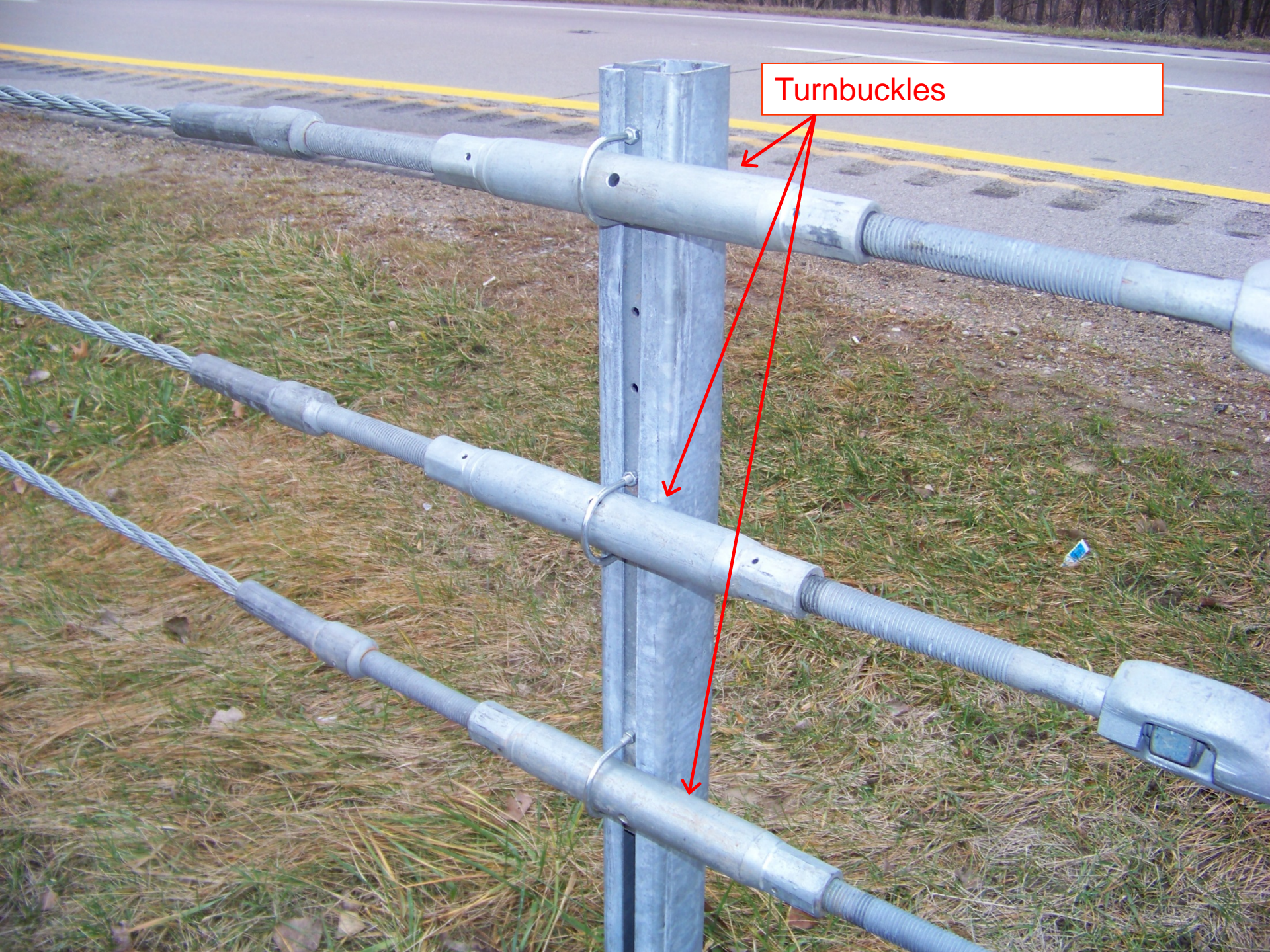


Loosening Turnbuckles

- 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



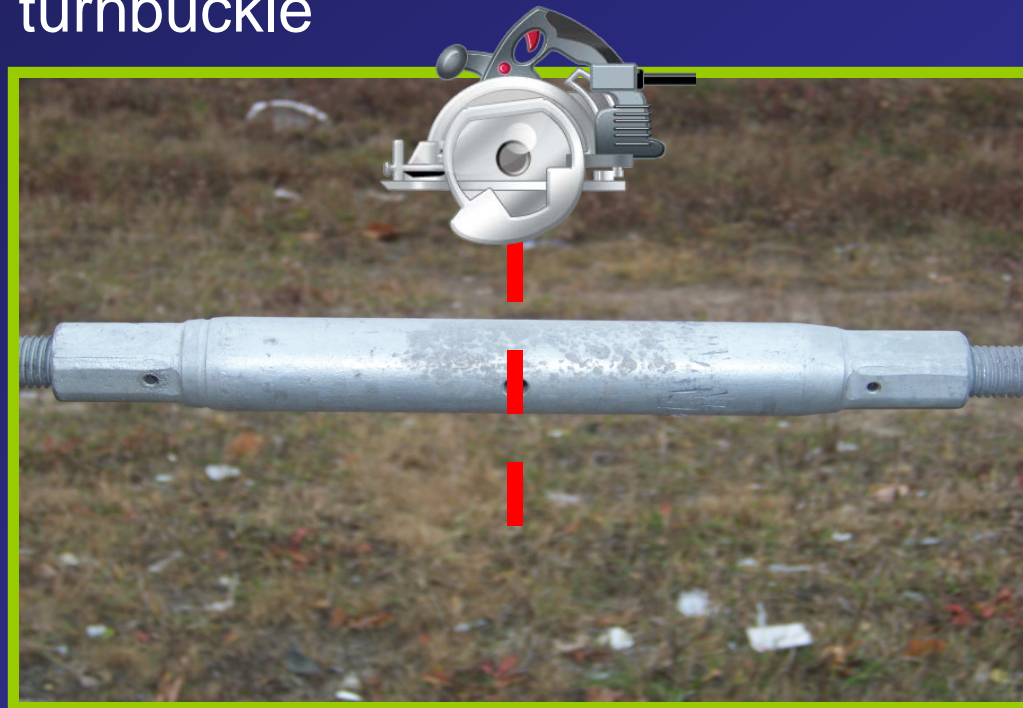
Note: Check both inspection holes while loosening turnbuckle



Turnbuckles

Cutting Turnbuckles

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



Cutting Turnbuckles

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



Cutting Turnbuckles

- 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

Cutting Turnbuckles

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



Cut in the middle



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

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



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 1 – K12 Circular Saw



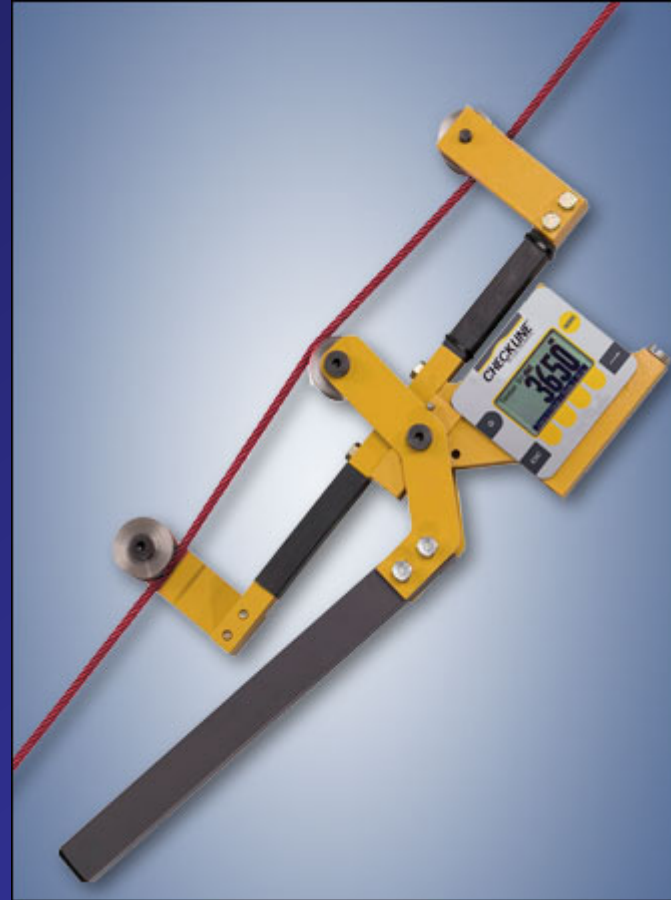
Cable Barrier Maintenance



Tools of the Trade

Tensiometer (Tension Meter)

- Used to determine amount of tension applied to cable
- Only used with high-tension cable barrier
- Manufactured by several different companies
- Around \$1,800 each



Gibraltar Tension Chart

Cable Tension	
-10F	8000
0	7600
10	7200
20	6800
30	6400
40	6000
50	5600
60	5200
70	4800
80	4400
90	4000
100	3600
110	3200

Allowable Deviation
from Chart +/- 10%

Tools of the Trade

Infrared Thermometer

- Used to determine cable temperature for proper tensioning
 - Never use ambient temperature for determining tension
- Manufactured by several different companies
- Fairly inexpensive



Tools of the Trade

Cable Puller

- May be necessary for assembling cable system
- Manufactured by several different companies
- Must use a cable puller that is capable of handling cable tension in winter conditions
 - 5 ton (10,000lb) minimum is recommended



Tools of the Trade

Cable Grips

- Manufactured by several different companies
- Use cable grips that are capable of handling large loads
 - 10,000 lb minimum
- Use cable grips with safety latches
 - Grip can slip off cable without safety latches



Tools of the Trade

U-Bolt Cable Clamp

- Used to help keep cable grip from slipping along cable



Tools of the Trade

C-Clamp

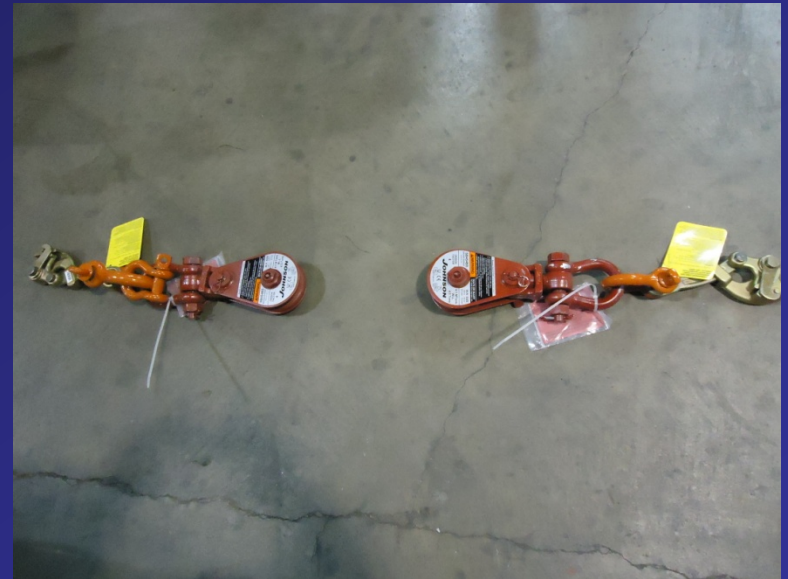
- Used to hold cable grip's safety latch in place
- Helps resist lateral loads imparted on the safety latch during cable pulling



Tools of the Trade

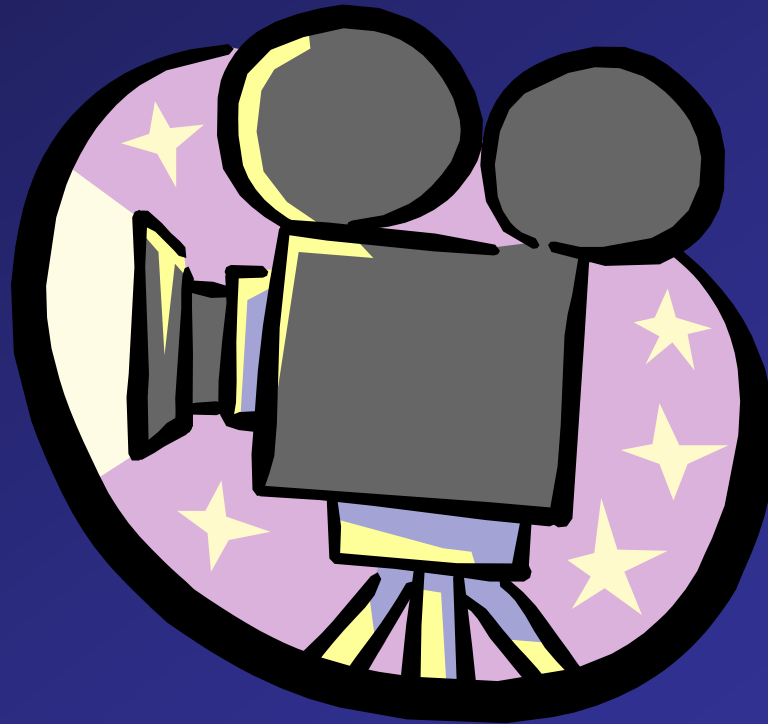
Cable Pulleys

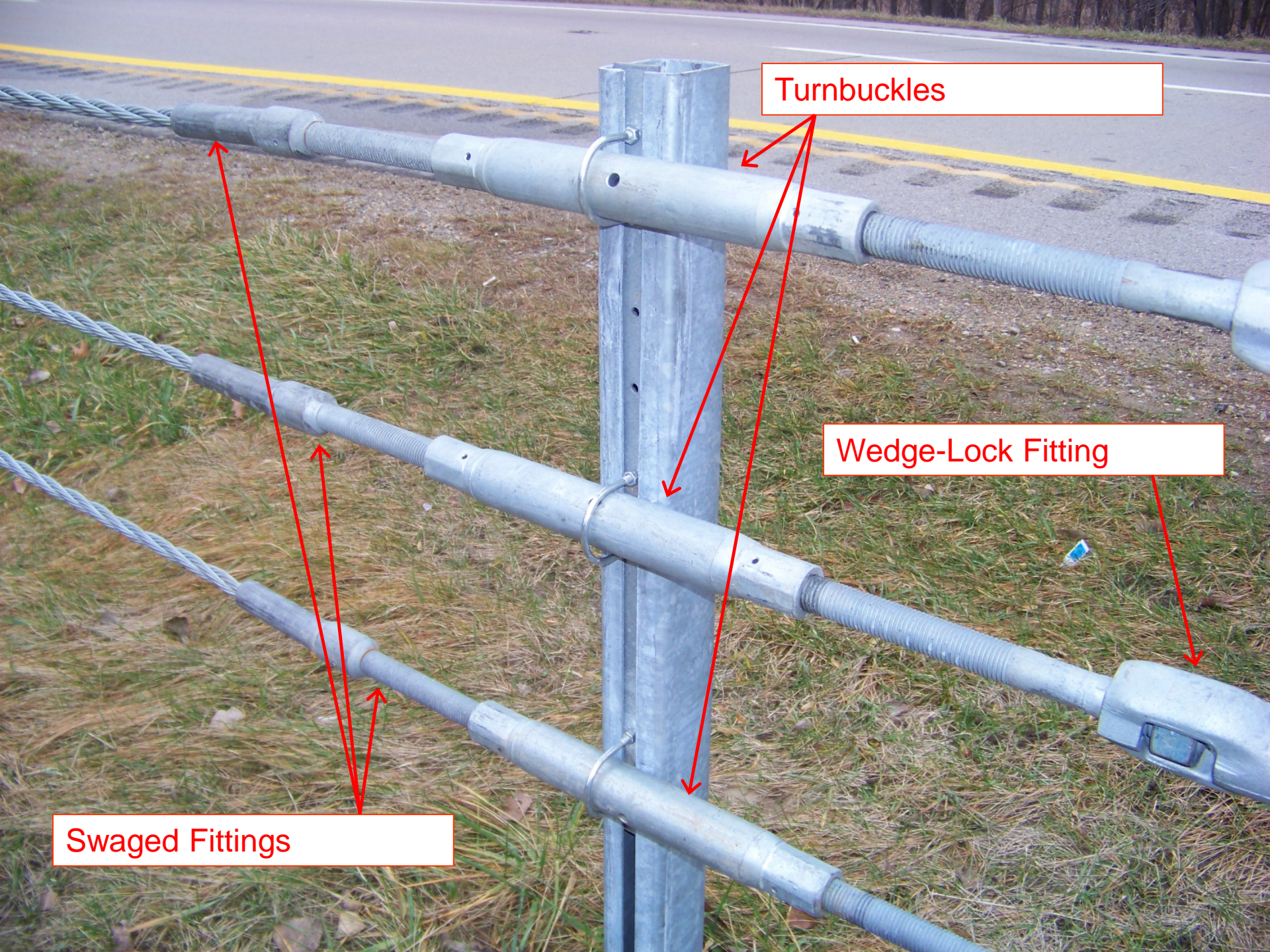
- Alternative method of pulling cables
 - Requires a vehicle for pulling cables
- Ensure pulleys and shackles are capable of withstanding operating loads
 - 10,000 lb minimum is recommended





Gibraltar Cable Barrier Winter Repair (December 2010) I-96 in Ionia County, Michigan





Turnbuckles

Wedge-Lock Fitting

Swaged Fittings

Anti-Seize Lubricant
(Marine Grade)



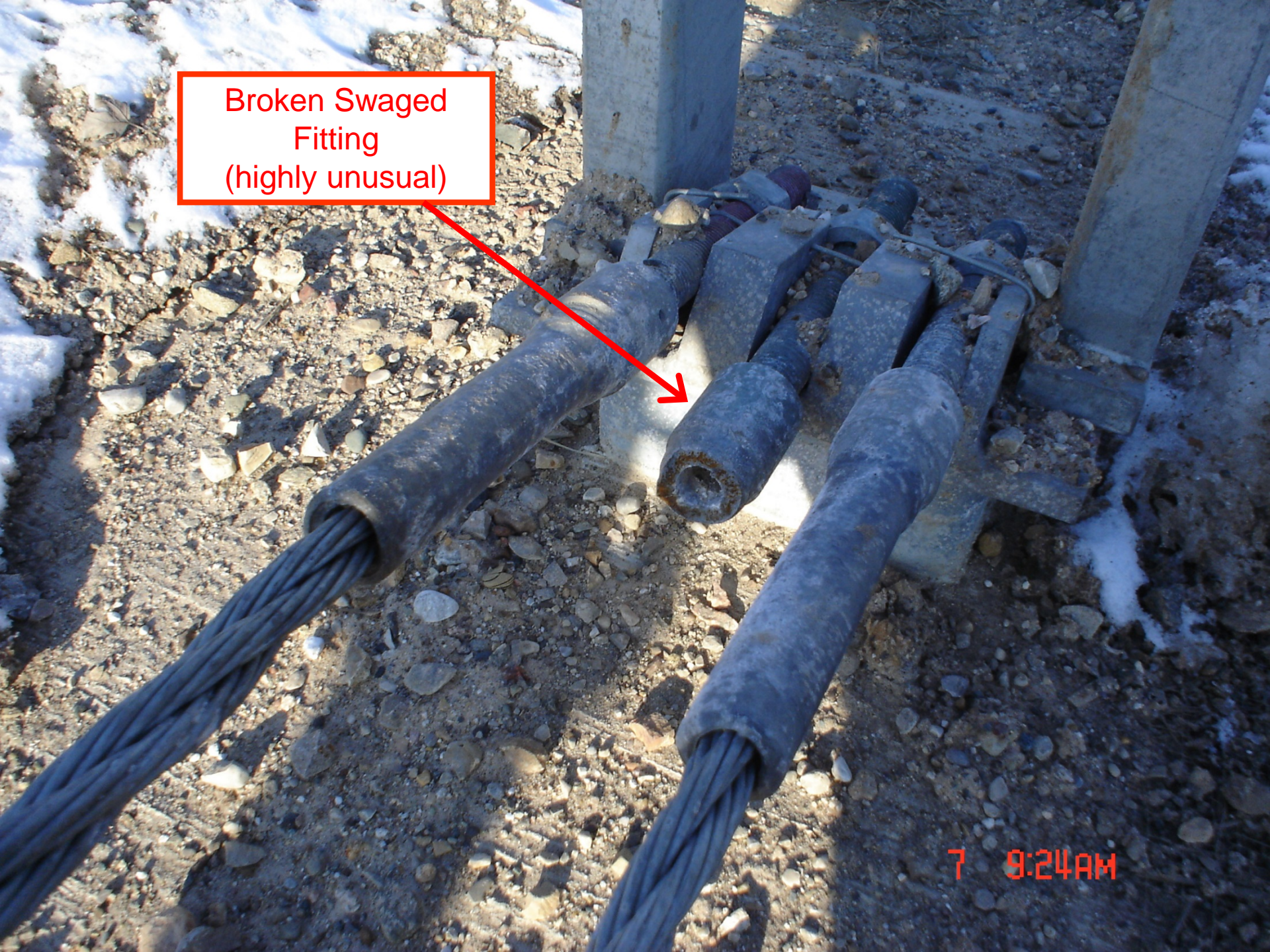
Wedge-Lock Fitting



One wire crimped
over wedge base



Broken Swaged
Fitting
(highly unusual)



7 9:24AM





Torpedo Cable Splice
(used for splicing cables)

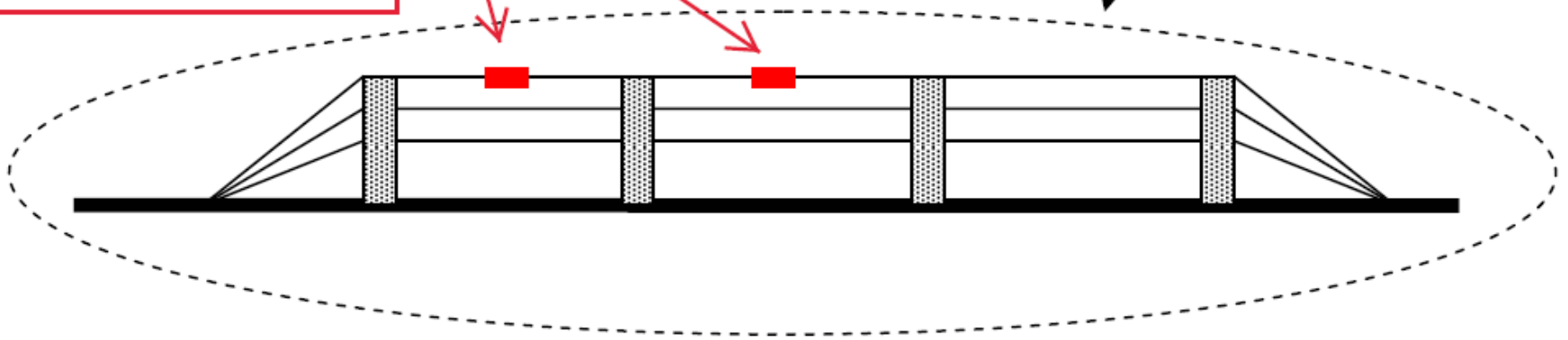


Torpedo interfering with Terminal Post
(unacceptable repair)



Recommendation:
Two torpedoes
(max) per cable per
run

One Cable Run



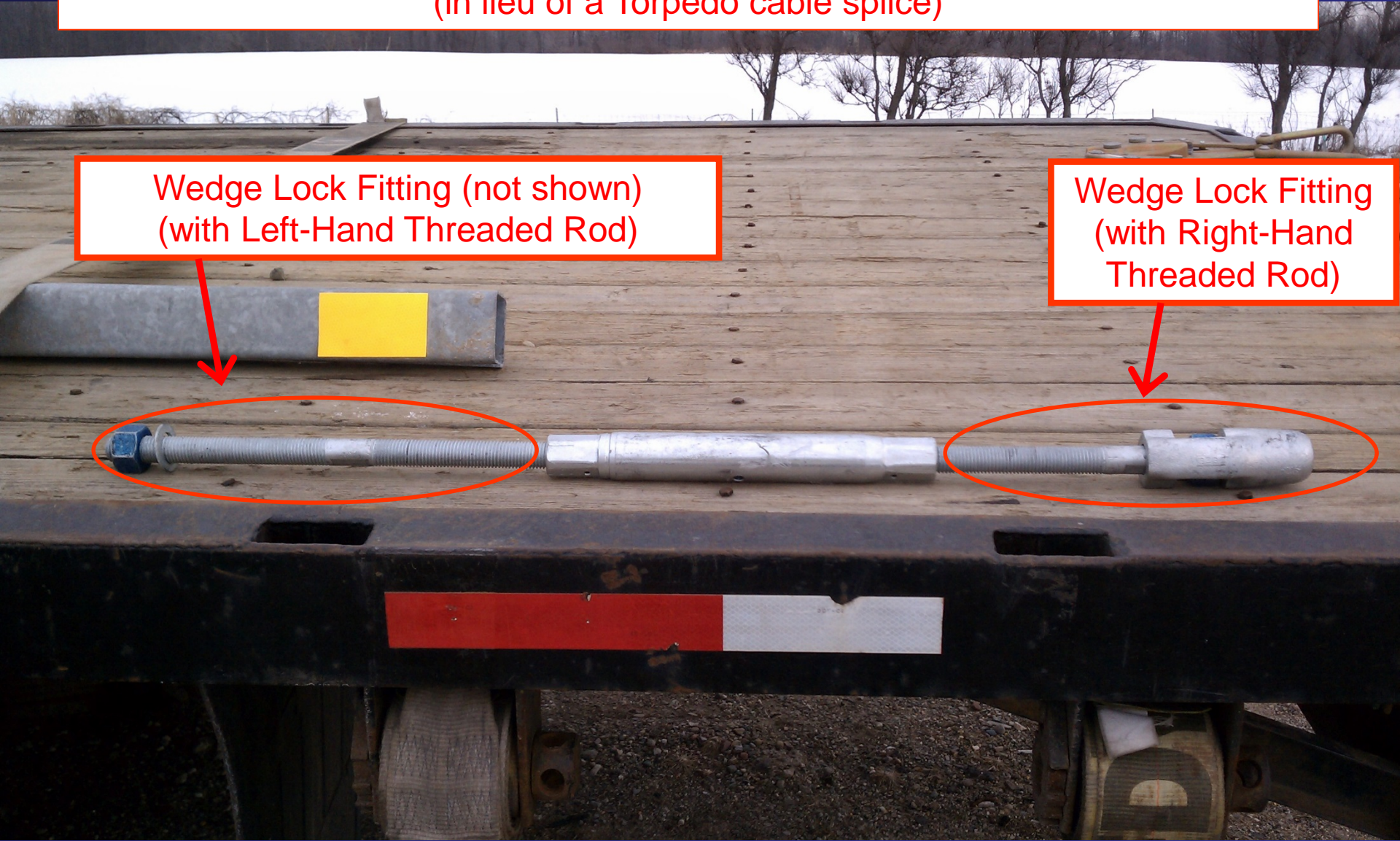
HOWEVER, using two wedge lock fittings and a turnbuckle is *preferred* over a Torpedo cable splice

No limit on the number of wedge lock fittings and turnbuckles

Two wedge lock fittings and a turnbuckle
(in lieu of a Torpedo cable splice)

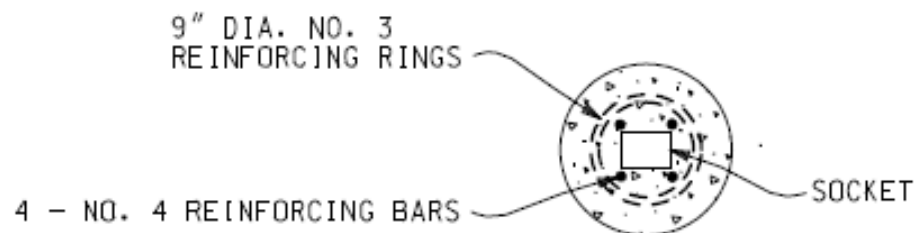
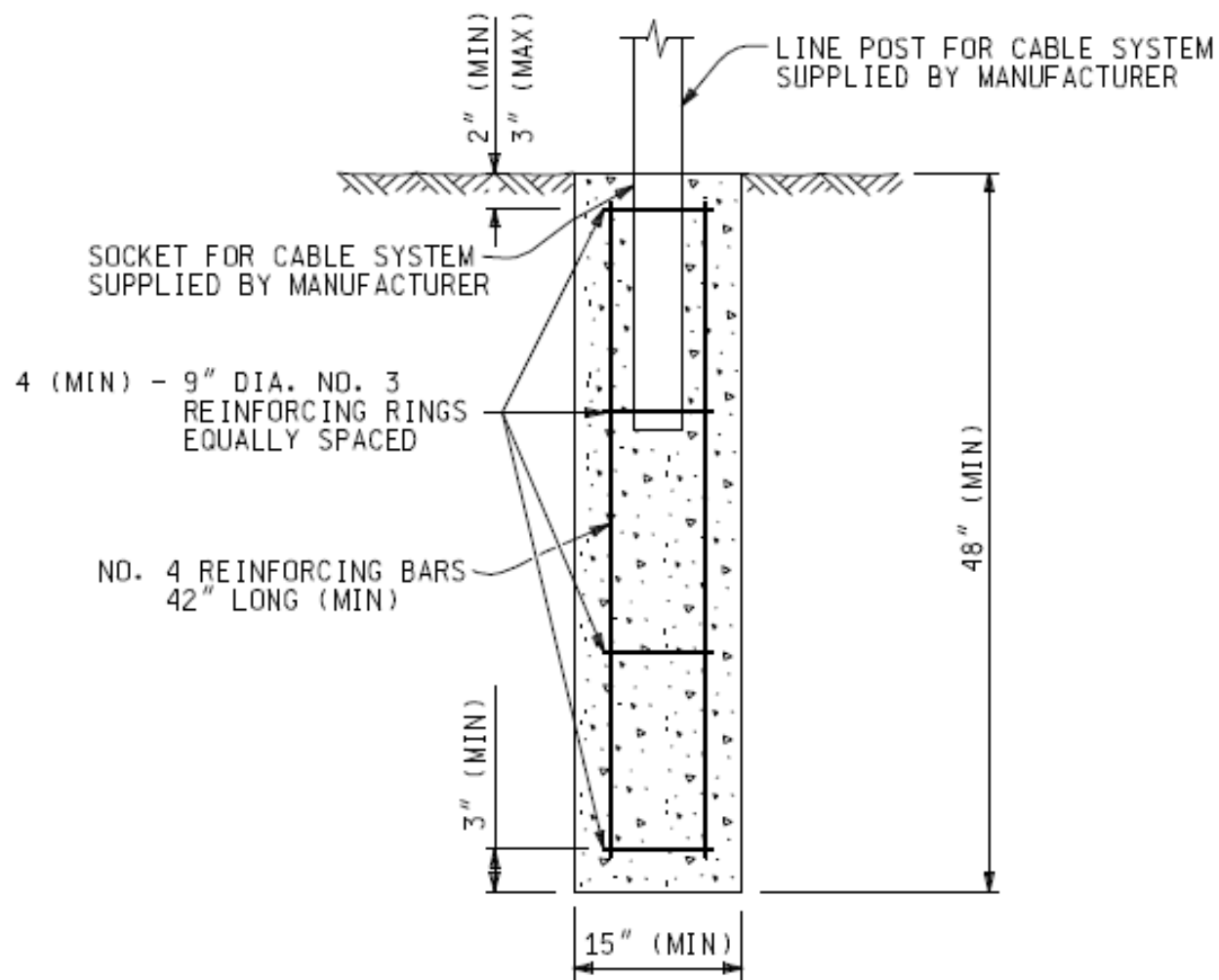
Wedge Lock Fitting (not shown)
(with Left-Hand Threaded Rod)

Wedge Lock Fitting
(with Right-Hand Threaded Rod)





Concrete Line Post Foundation

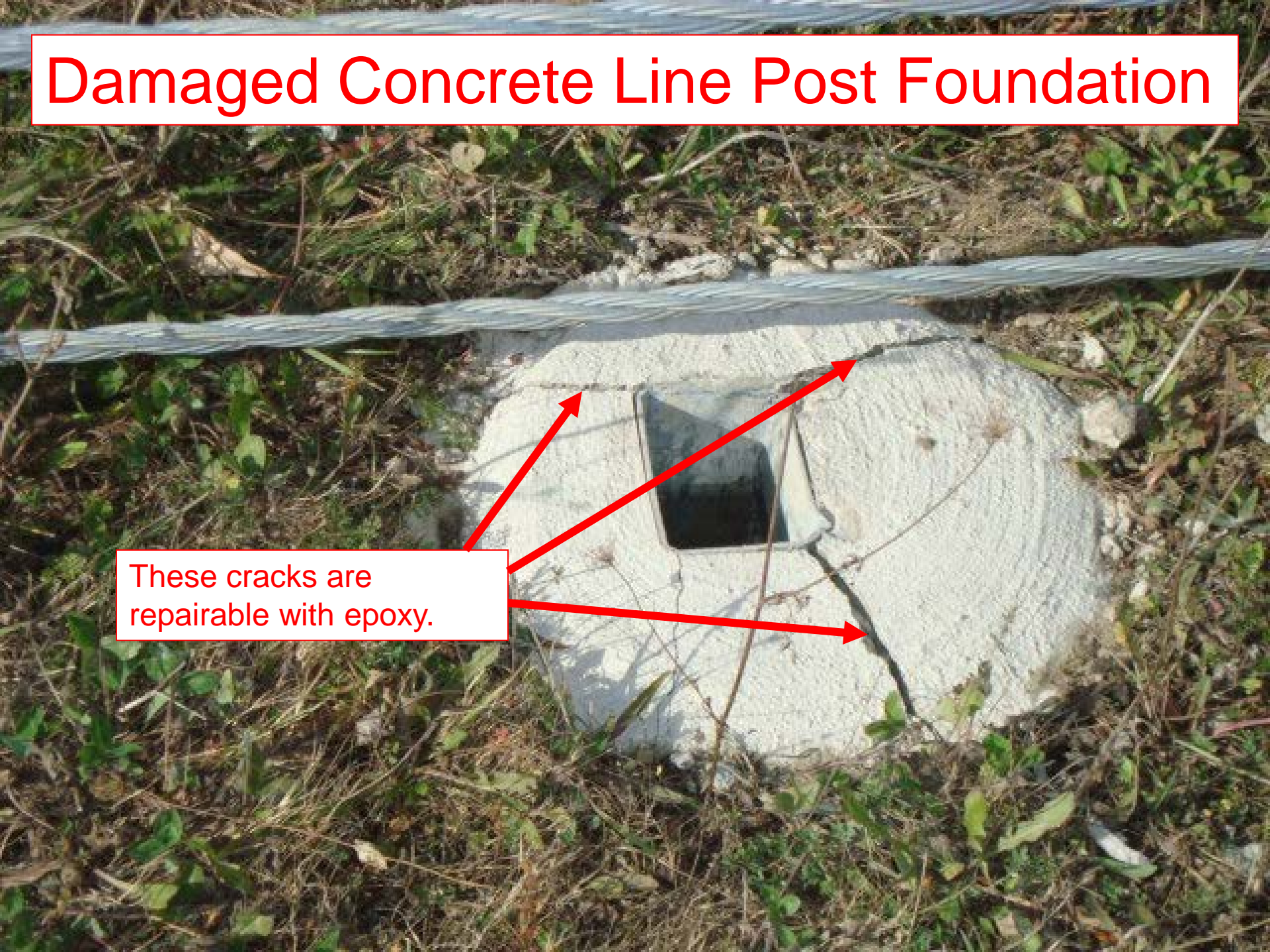


Damaged Concrete Line Post Foundation

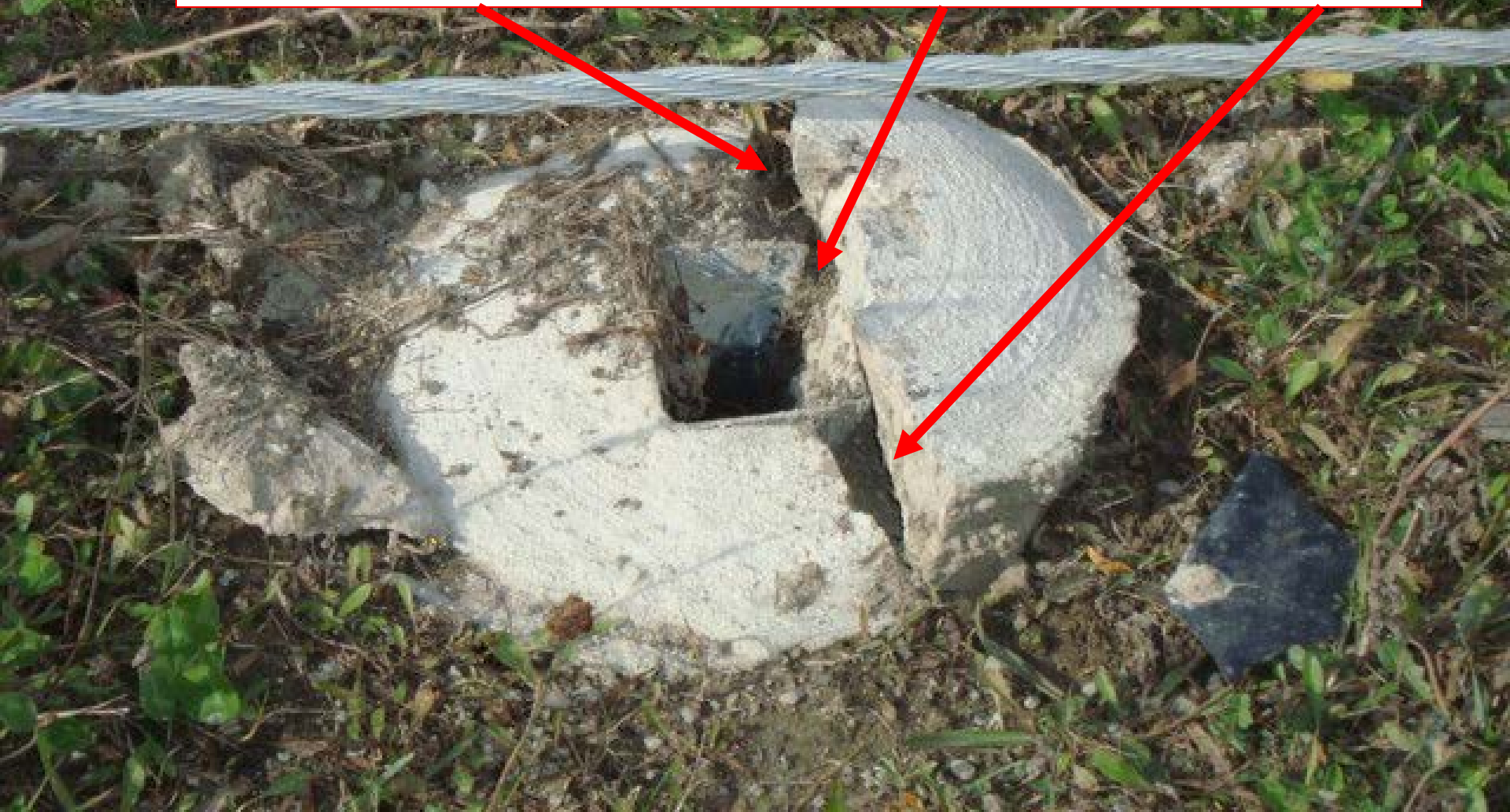


Damaged Concrete Line Post Foundation

These cracks are
repairable with epoxy.



Significant crack exceeding $\frac{1}{2}$ " in width, and the sleeve appears to be damaged. Therefore, foundation should be replaced.





Consider using a driven socket to replace a damaged concrete line post foundation



Questions?