



MASH 2016

TL4 CABLE BARRIER SYSTEM

INSTALLATION GUIDE

**Gibraltar Cable Barrier System
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[Note to Installer: Refer to Contract Plans and Documents for Specific Details]
The Gibraltar Cable Barrier Systems are covered by one or more of the following
patents: U.S. Patent No(s): 7,364,137; 7,398,960; and 7,401,996. Other U.S. and
International patents are pending



INSTALLATION GUIDE

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Welcome

Welcome to the Gibraltar Cable Barrier System Installation and Maintenance Guide. This guide is for your use when installing Gibraltar's cable barrier system. This installation guide is for standard cable barrier installations.

Before You Begin:

Check and confirm packing list contents. Please report any errors or shortages immediately to Gibraltar at: (833) 715-0810 or (512) 715-0808.

System Installation & Components

- Cable Barrier System – Longitudinal Section Layout
- Cable Barrier System – Terminal Section Layout
- Cable Interchanging
- Parts Lists

Equipment/Tools Required

1. Auger (for Socketed Line Post and Terminal Post foundations)
2. Auger (Anchor Post foundation)
3. Post Driver (for Driven Post option)
4. Adjustable Wrench (2)
5. Tension Meter
6. Utility Trailer (rigged for Wire Rope Spools)
7. Flathead Screwdrivers (2)
8. 3 Ton (6000 lb.) Chain Hoist (6 Ton hoist may be required in cold climates)
9. Cable Grabbers (2)
10. Vice Grips (large enough to fit over 3/4in cable) or 3/4in cable clamps
11. Thermometer



GIBRALTAR MASH 2016 INSPECTION CHECKLIST

TERMINAL SECTION

- ☐ Ensure the anchor post is centered in the hole on stringline, the anchor plate is set no more than 1" above grade and is set plumb using the cable release post.
- ☐ Ensure terminal post #1 leans 1 ¼" every 12" out of plumb towards the anchor and the top of the socket is at grade (p. 5).
- ☐ Ensure the second terminal post socket is set plumb and the top is set at grade. Ensure the terminal posts "open" side is away from the center line (p. 6), and the j-bolts are installed.
- ☐ Ensure the cables are set in each j-bolt and on the 2nd terminal post, the top cable is resting on the 3rd cable (p. 6)
- ☐ Ensure all fittings are installed correctly with the wedge correctly installed in the acorn fitting (p. 7 & 12).

LENGTH OF NEED

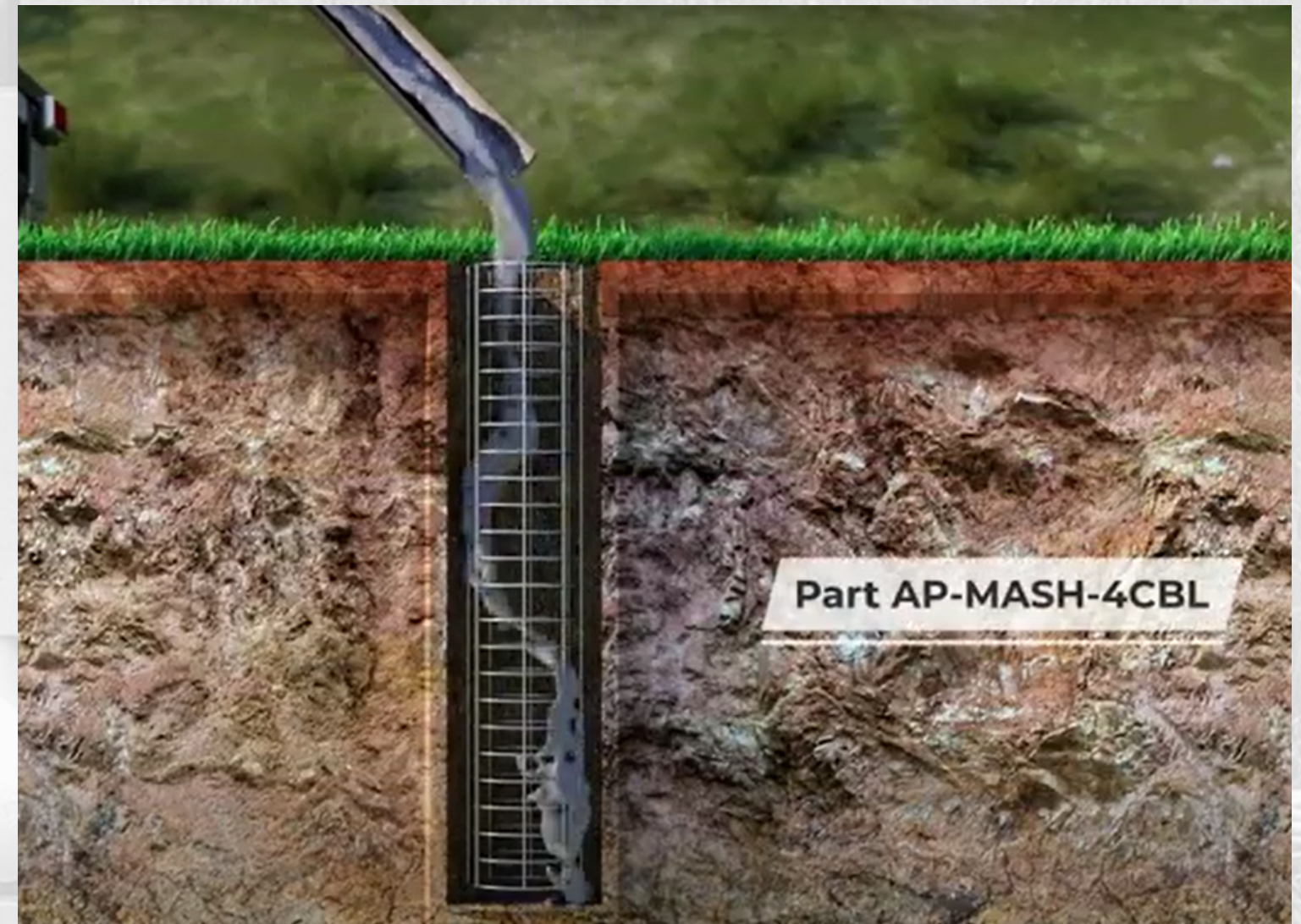
- ☐ Ensure line post sockets are set plumb, with the short side of socket on the stringline and the top is flush with grade. A post can be used to make sure the socket is plumb.
- ☐ Ensure posts are set in the sockets with the open C is facing the cables, and the hairpin and lockplates are installed in each post.
- ☐ The posts in the terminal and the next five posts after the terminal must alternate on sides of cable, the remaining posts should alternate throughout the system. In some cases, it is not possible to have all posts on alternating sides of cable, 3 posts on the same side of cable is acceptable in these situations, contact Gibraltar if this occurs more than once in a single run.
- ☐ Ensure each cable of each run has at least one set of cable splice turnbuckles (CSTB). The turnbuckles should be no greater than 2,000 ft apart. Ensure the CSTBs on the top two cables are separated and are not touching each other.
- ☐ Ensure the cables are properly installed in each post utilizing the hairpin and lockplate design. The top two cables should alternate being in the top hoop of the hairpin and being set on top of it. There should be no twisting of the cables from post to post. (p. 11)
- ☐ Ensure the cables are all tensioned within 10% of the tension chart shown on the drawings and are noted in a tension log.



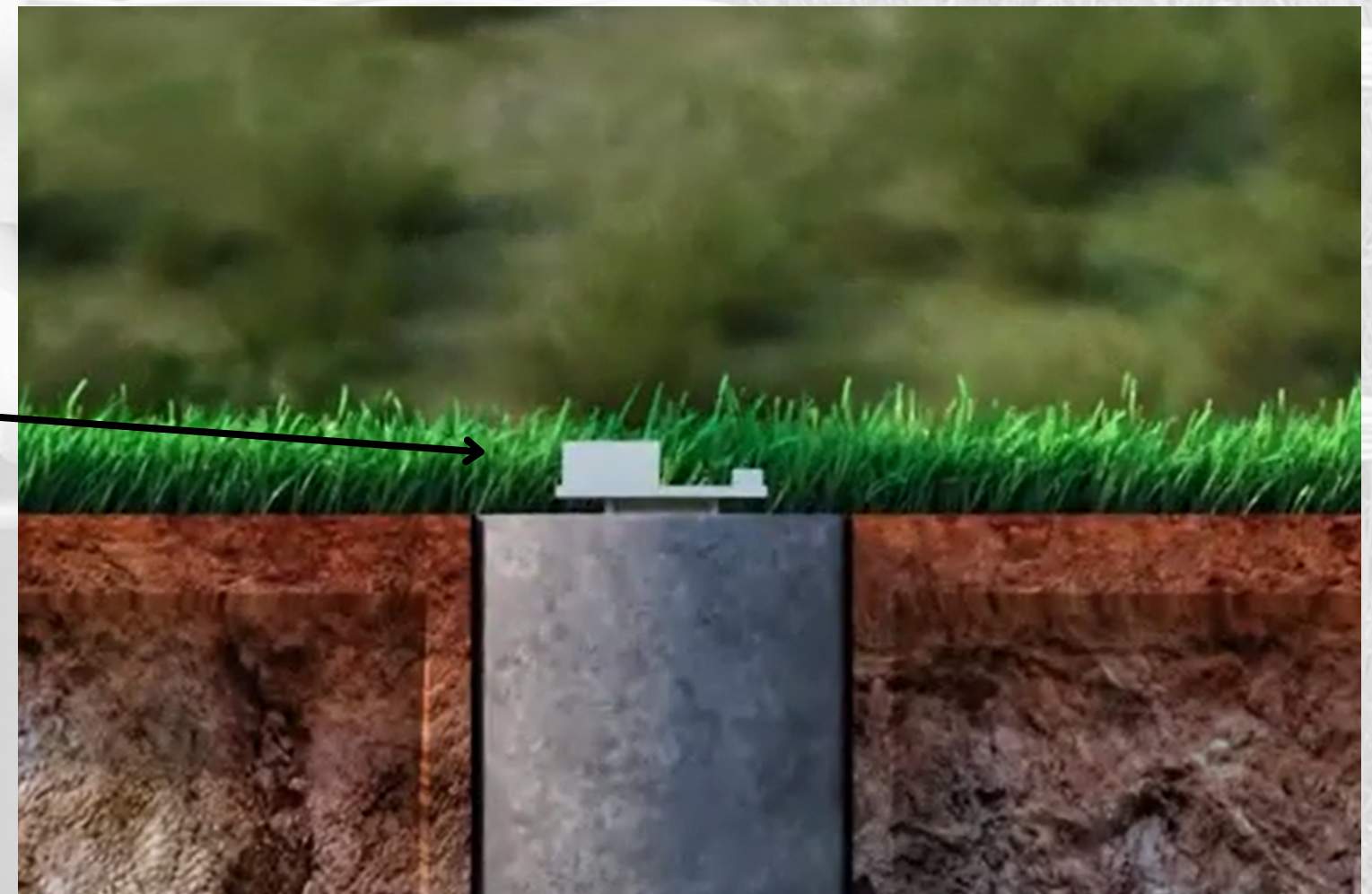
ANCHOR INSTALLATION



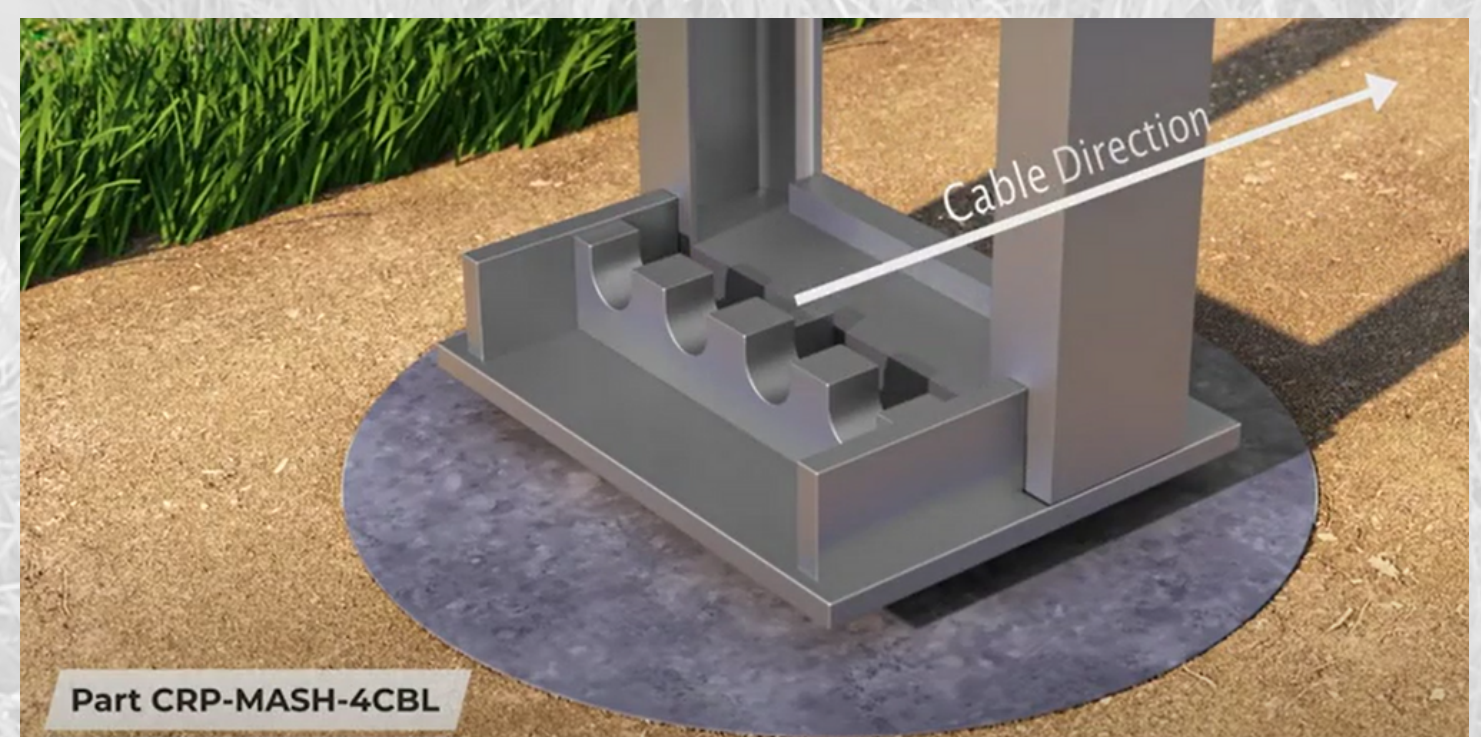
1) Begin by drilling the appropriate size anchor hole. Install the rebar cage, then fill it with concrete.



2) Set the anchor posts in concrete. The top plate on the anchor posts should be no more than 1" above grade and the post should be installed plumb.



3) Set the cable release post (CRP) on top of the anchor post. If the CRP is not plumb than the anchor post should be adjusted so that the CRP is plumbed.





ANCHOR INSTALLATION

(CON'T)



Critical Points

- Anchor Post and Cable Release Post should be plumb.
- Anchor Post Plate should be no more than 1" above concrete.
- Install Cable Release Post as shown.



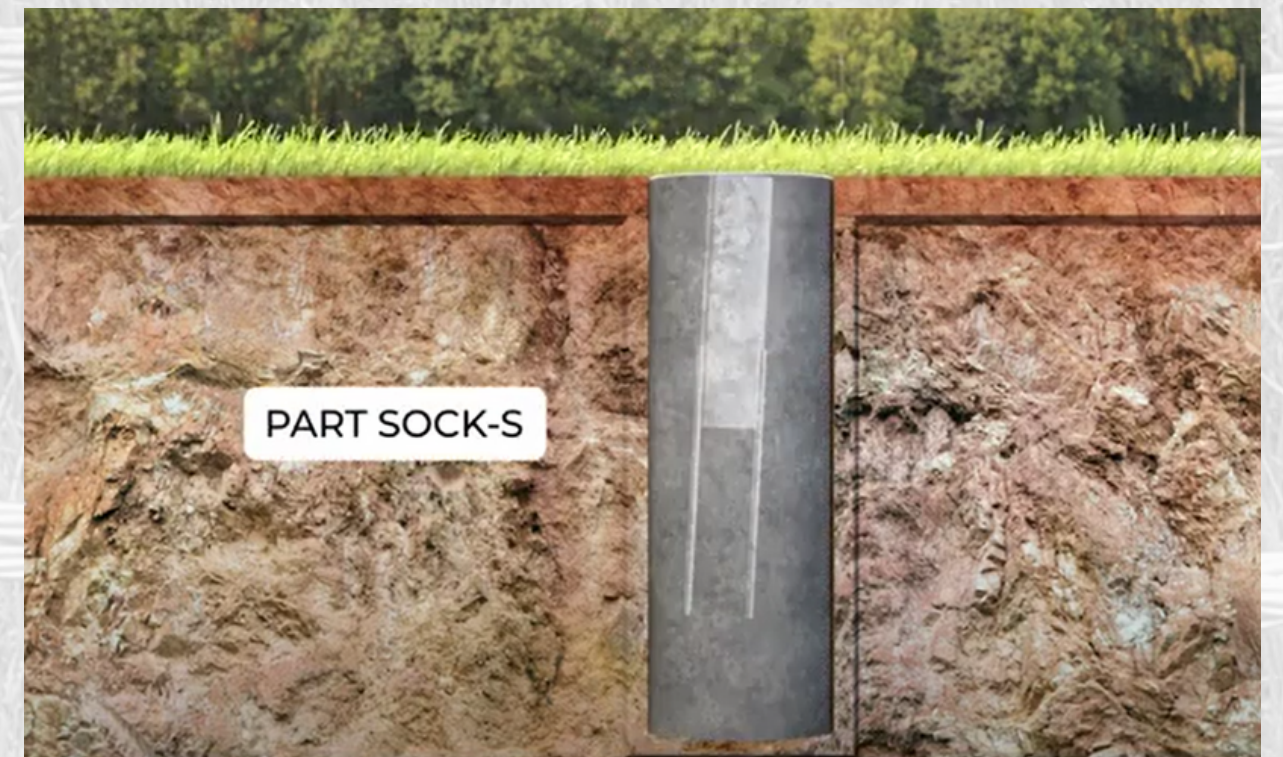
TERMINAL POST SOCKET



1) Start the first terminal post socket by drilling the appropriate size socket hole and filling it with concrete.



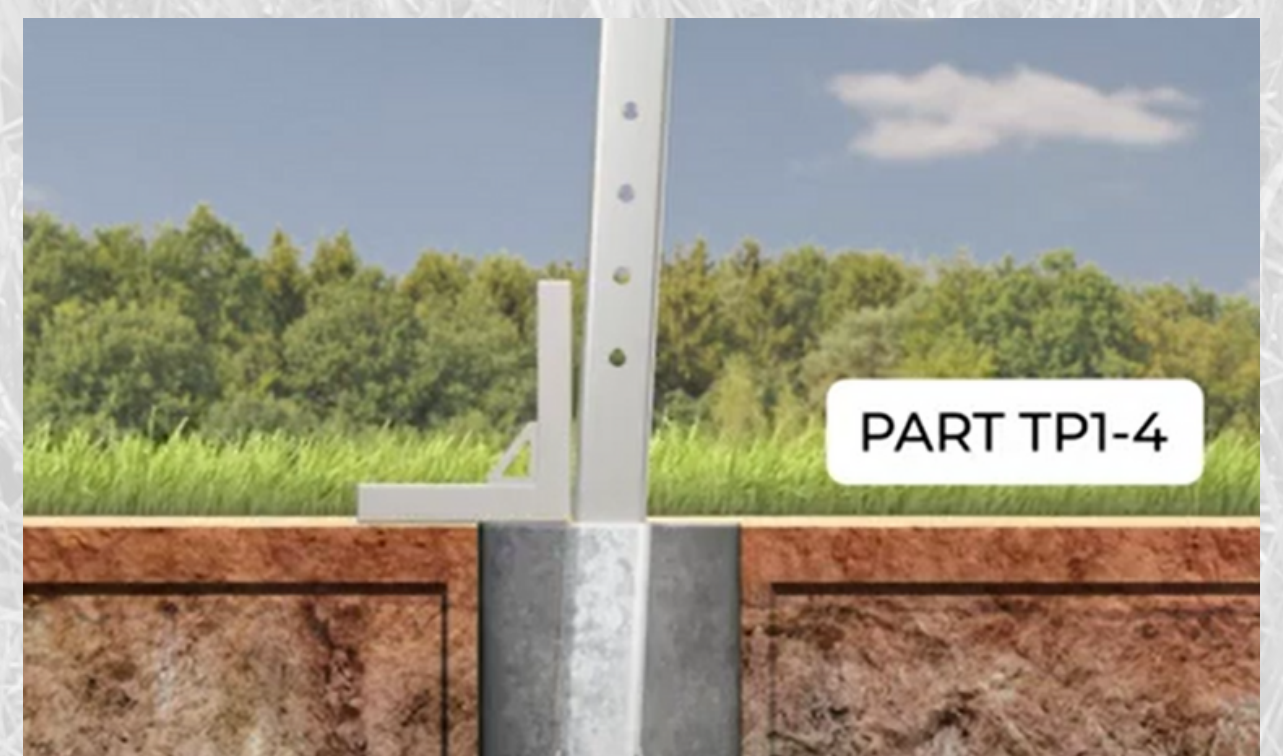
2) Install the socket into the concrete. The socket type may be different than shown. This particular socket is the only socket that is set at an angle.



The socket should be set so that the top of the socket is flush with grade.



3) Insert the socket at an angle so that when TP1-4 is placed in the socket, the post is 1-1/4" per 12" out of plumb. Socket and post should lean towards the CRP.

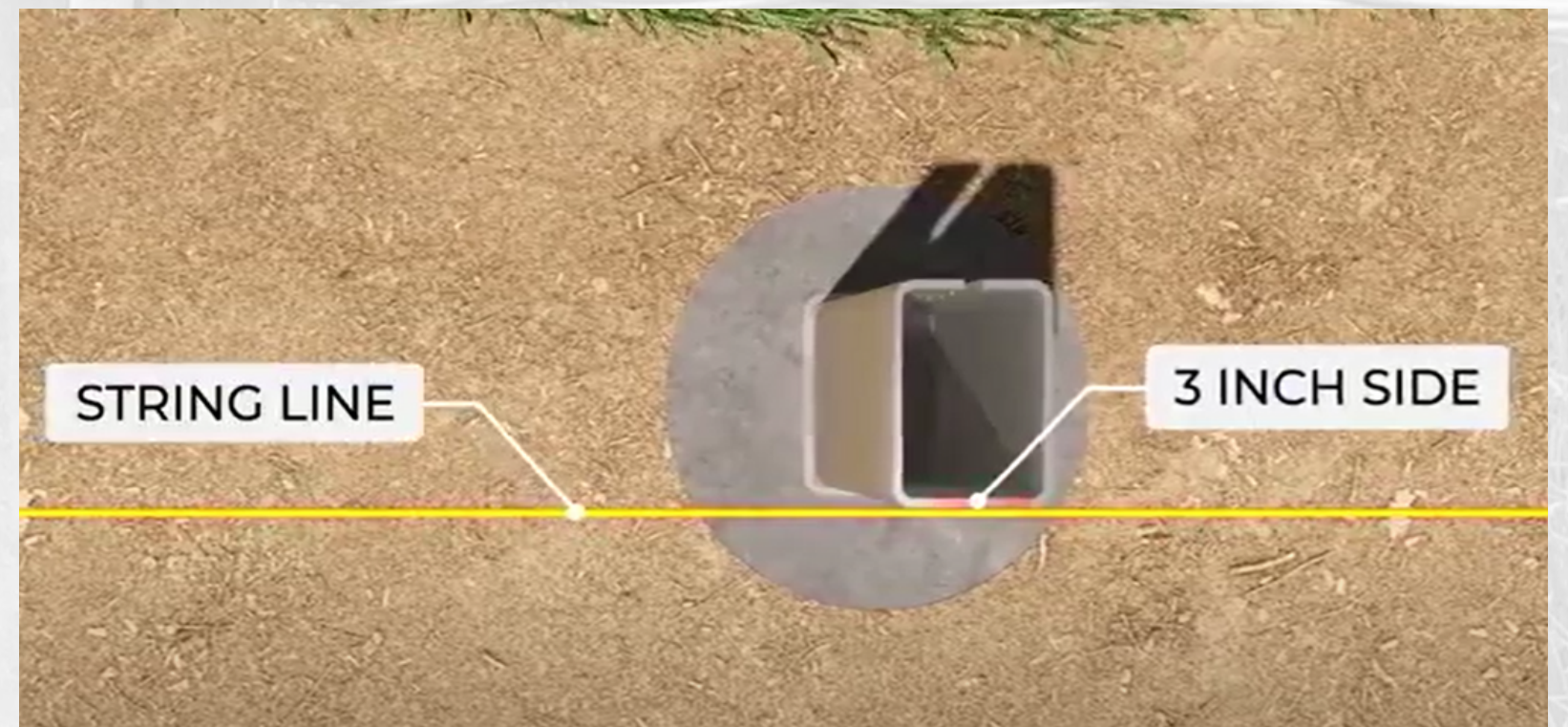




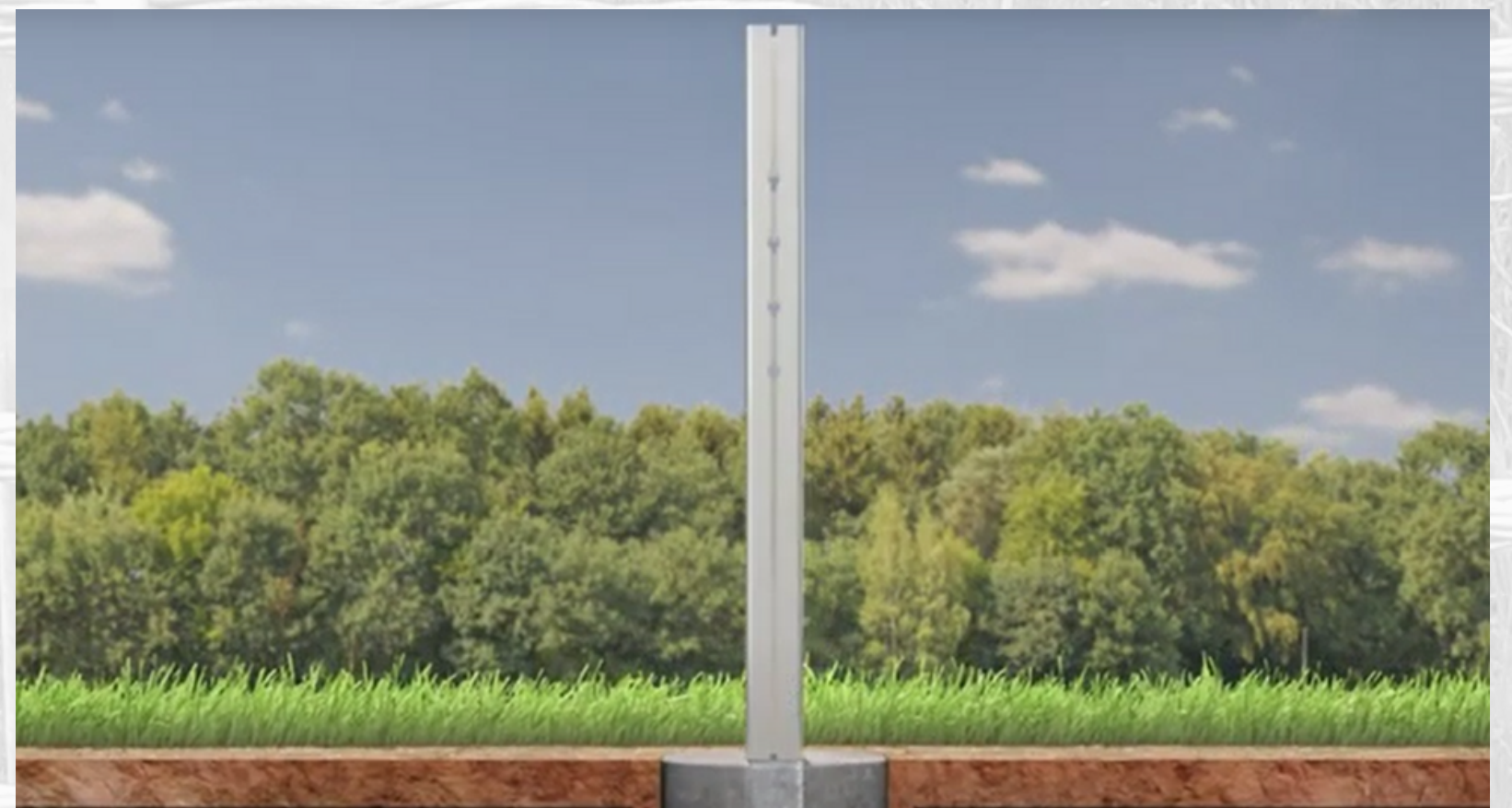
TERMINAL POST SOCKET (CON'T)



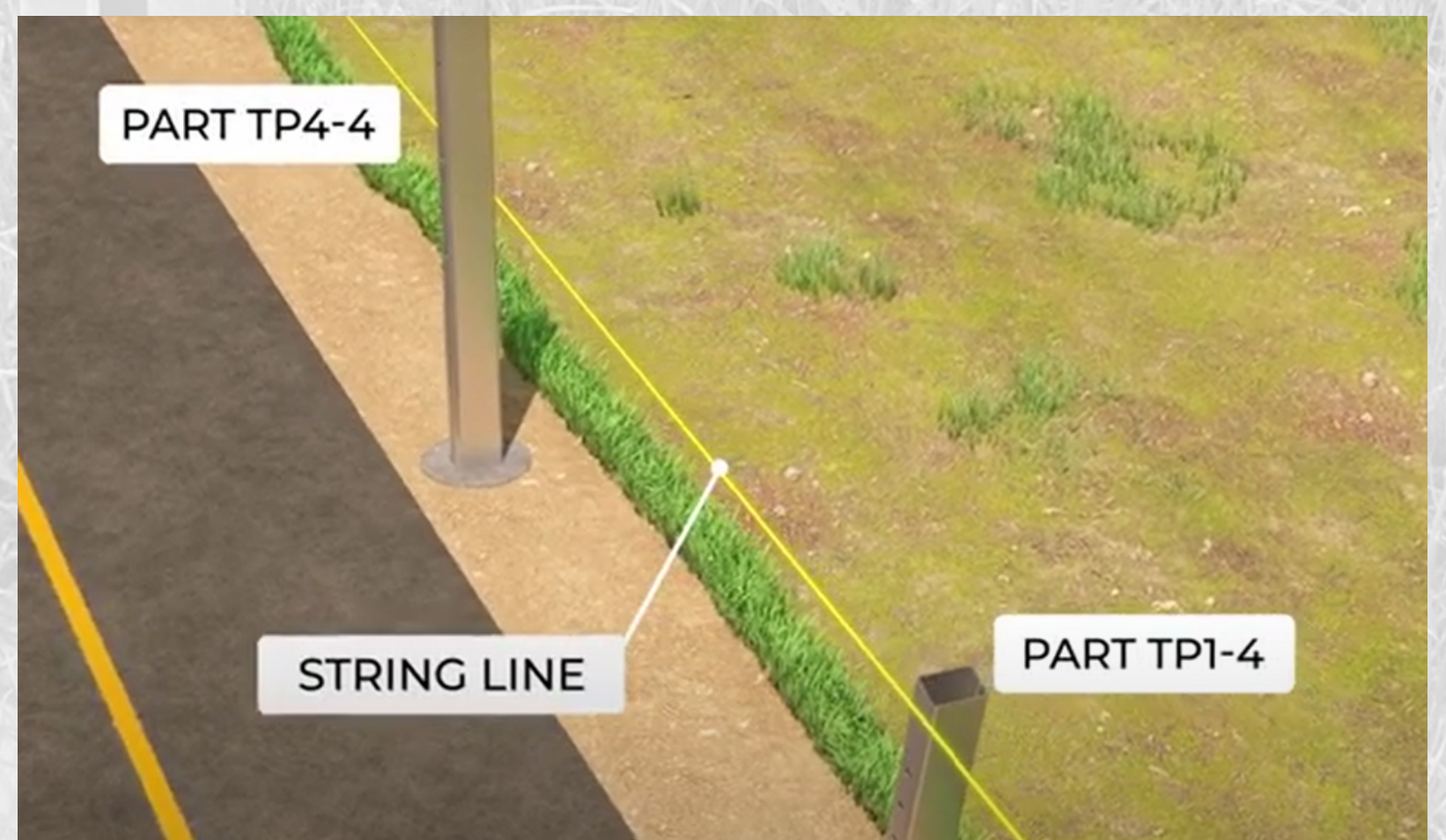
4) Be sure the 3-inch side of the socket is flush with the string line. This string line represents the cable line.



5) The last terminal post socket is set plumb in a socket hole which is filled with concrete.



This socket should be installed on the opposite side of the cable of the TP1-4 socket.

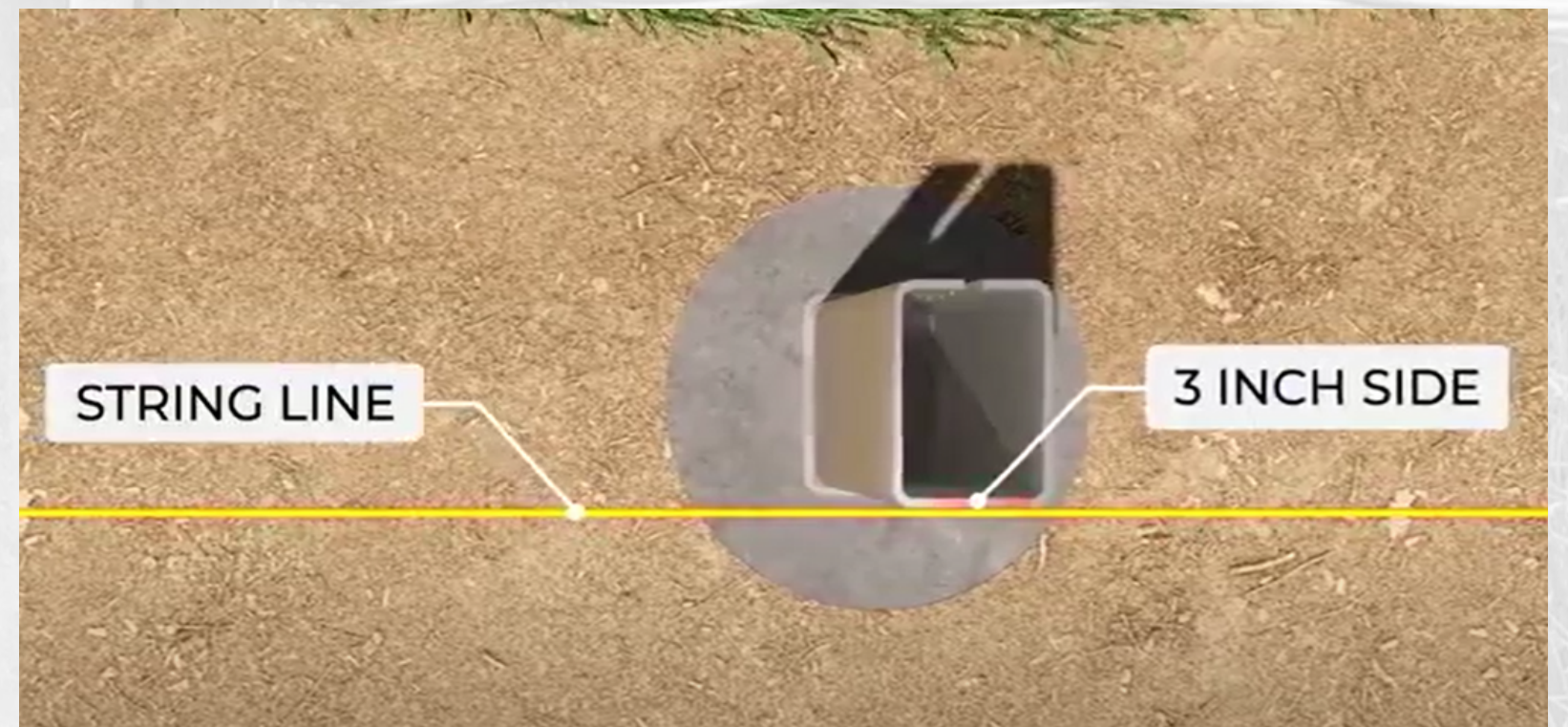




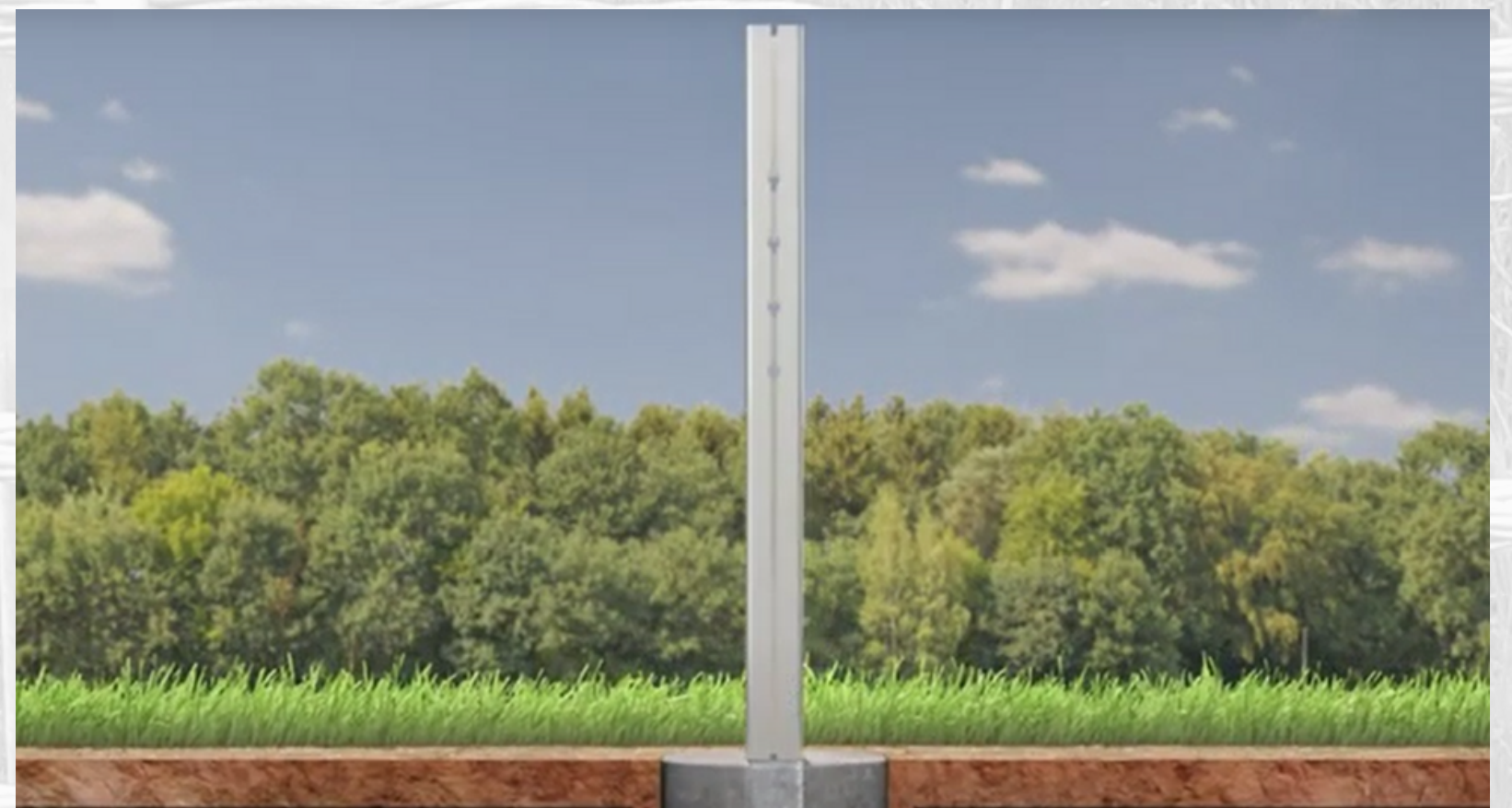
TERMINAL POST SOCKET (CON'T)



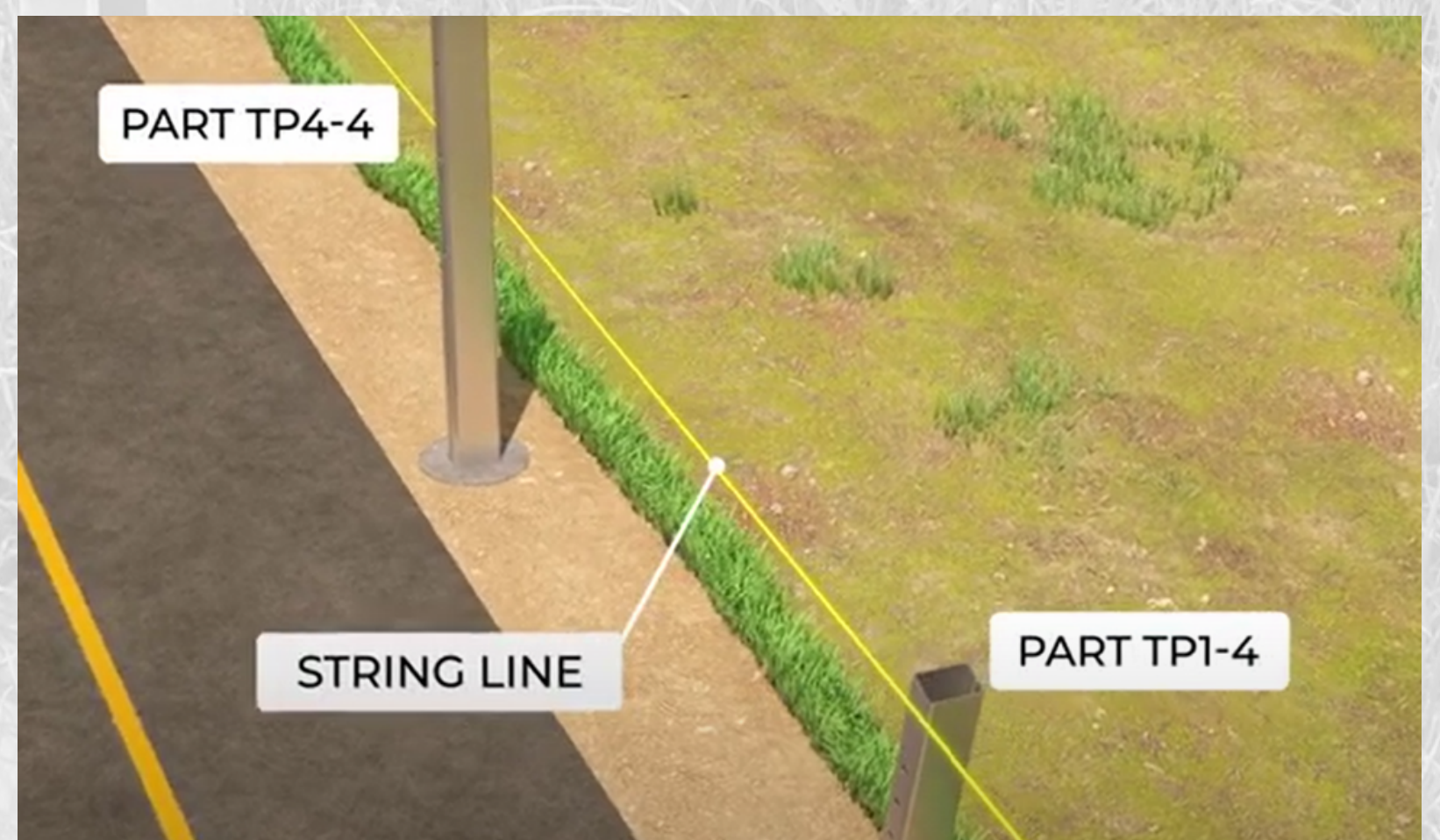
6) Be sure the 3-inch side of the socket is flush with the string line. This string line represents the cable line.



7) The last terminal post socket is set plumb in a socket hole which is filled with concrete.



This socket should be installed on the opposite side of the cable of the TP1-4 socket. Be sure the 3-inch side of the socket is flush with the string line.





TERMINAL POST SOCKET

(CON'T)



Critical Points

- Sockets are set on opposite side of cable.
- Short side of socket is on centerline.
- TP1-4 socket is set at an angle - $1\frac{1}{4}$ " per 12". Socket should lean towards CRP.
- TP4-4 socket is set plumb.
- TP1-4 socket located at 6'-3" from center of anchor post.
- TP4-4 socket located at 13'9" from center of TP1-4 socket.



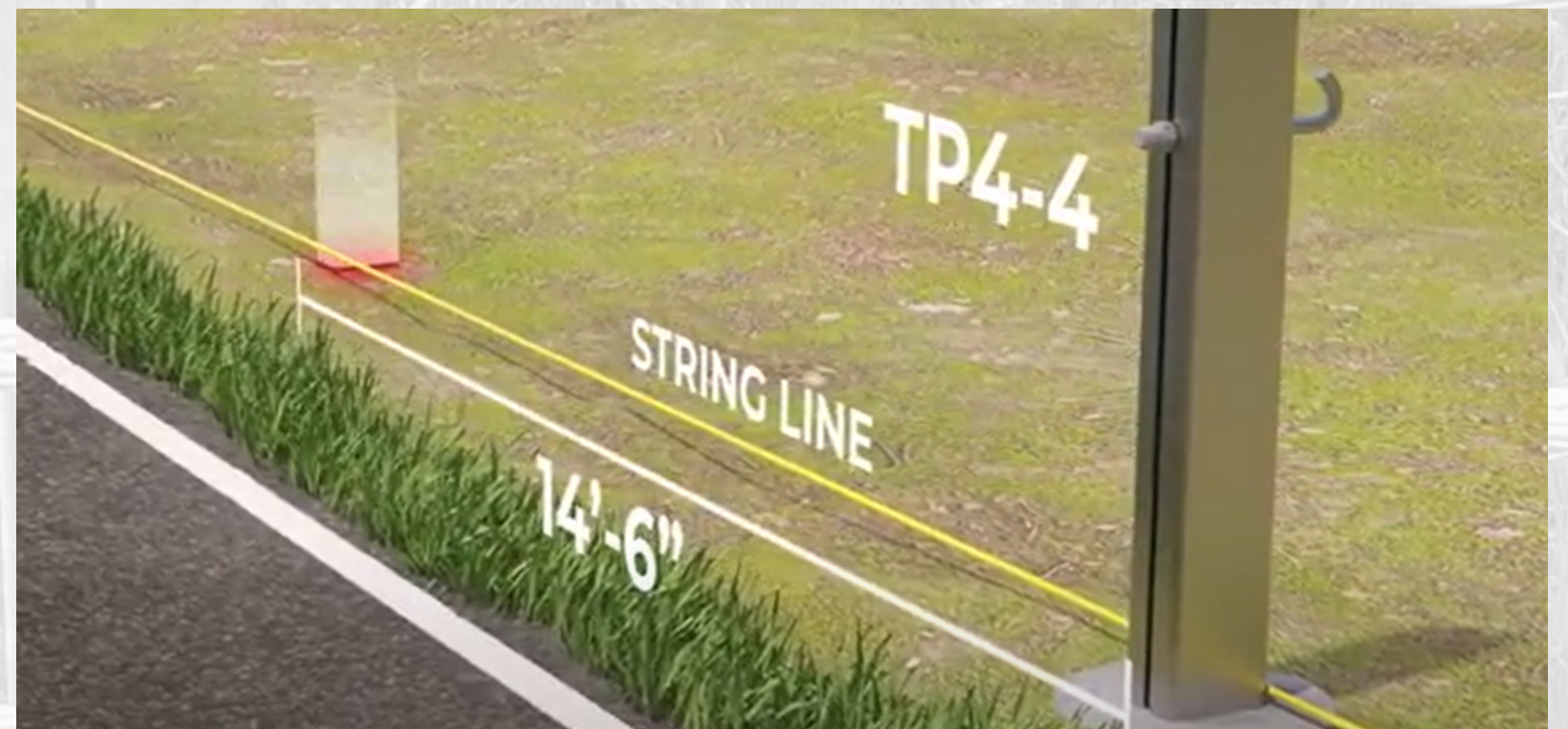
LINE POST SOCKET



1) Install a string line representing the cable location for the line post socket installation.



2) Locate the first line post socket at 14'6" from the last terminal post. Noting the socket needs to be on the opposite side of the string line of the TP4-4 post socket hole.



Drill the appropriate size hole with the center of the hole two inches off the string line and fill it with concrete.

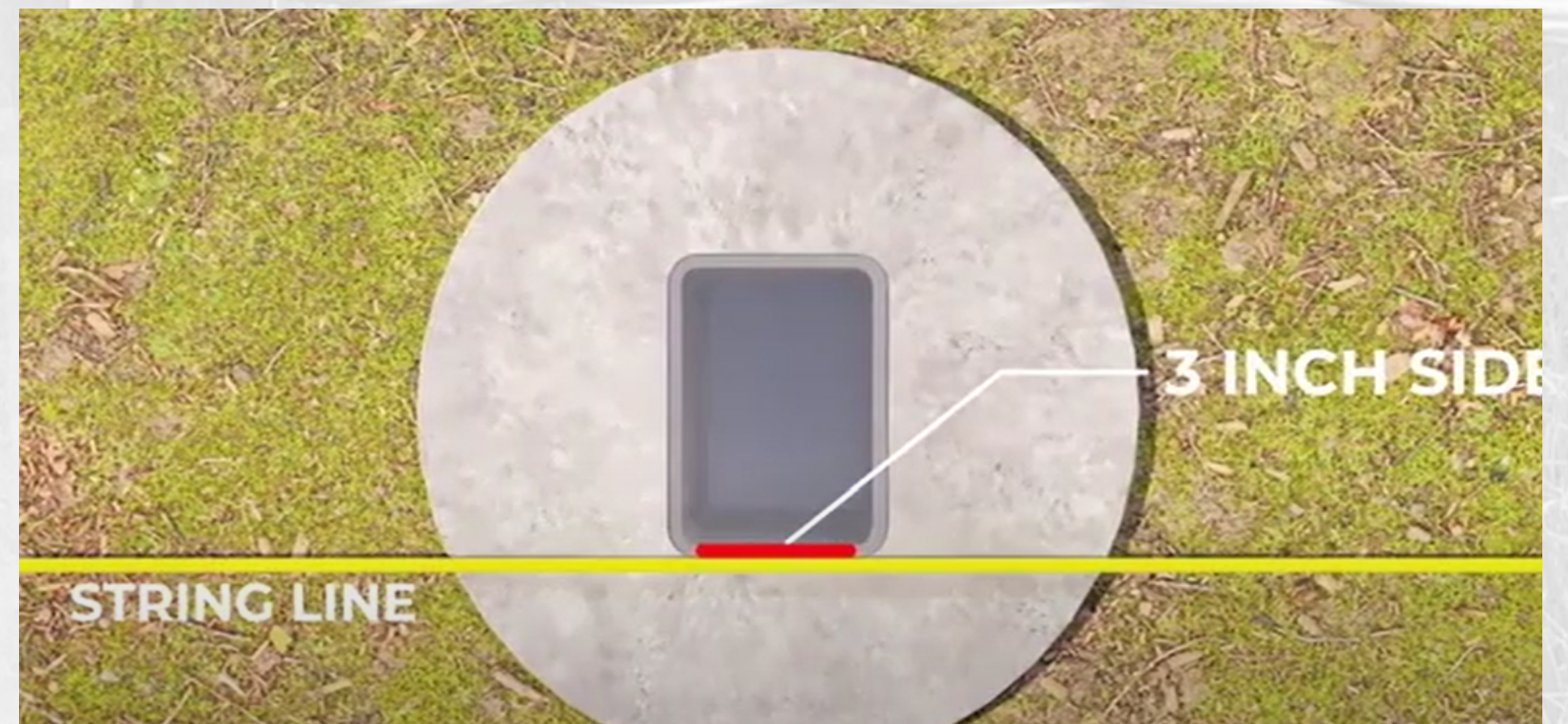




LINE POST SOCKET (CON'T)



3) Install the socket into the concrete. The socket should be set so that the top of the socket is flush with grade and the socket is plumb. Be sure the 3-inch side of the socket is flush with the string line. This string line represents the cable line.



4) A line post may be placed in the socket once the concrete is set. The next line post socket should be placed on the opposite side of the stringline at the project line post spacing and repeated towards the middle of the run. This procedure is the same for the opposite end of the cable run, and post spacing can be adjusted in the middle of the run.





LINE POST SOCKET (CON'T)



Critical Points

- Sockets are set on opposite side of cable alternating throughout the installation.
- Short side of socket is on the centerline.
- Line post socket is plumb.
- The first line post socket is placed 14'6" from the the TP4-4 post socket and on the opposite side of the string line of the TP4-4 post socket.



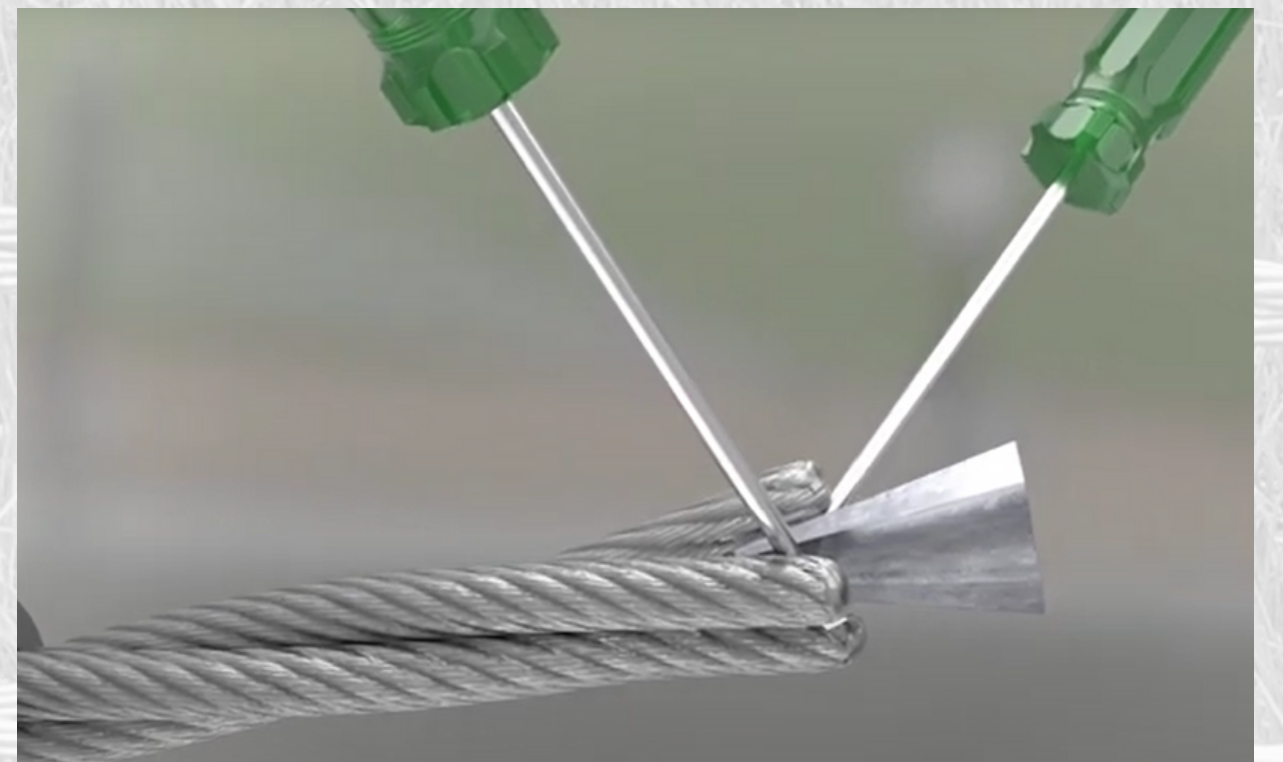
ANCHOR TERMINAL FITTING



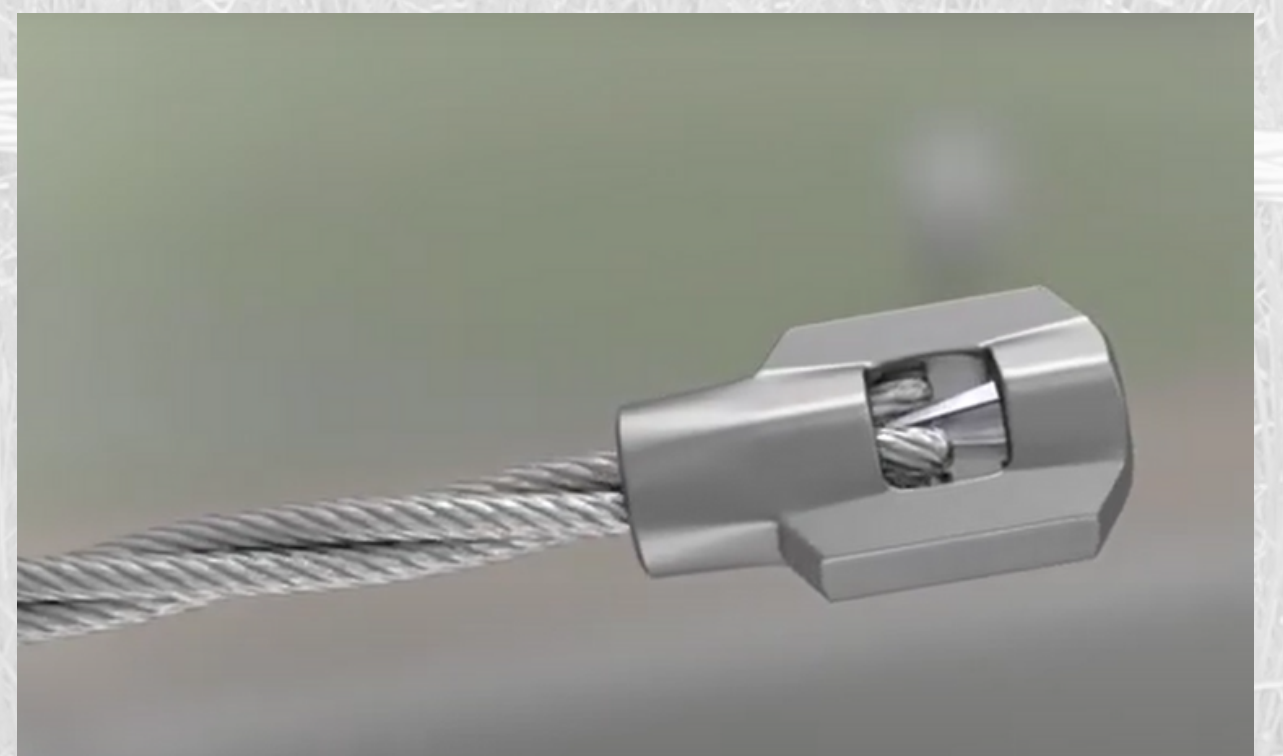
1) Connect the four cables to the Anchor Terminal Fittings by inserting the cable ends into the acorn-shaped casting of the cable terminal fittings.



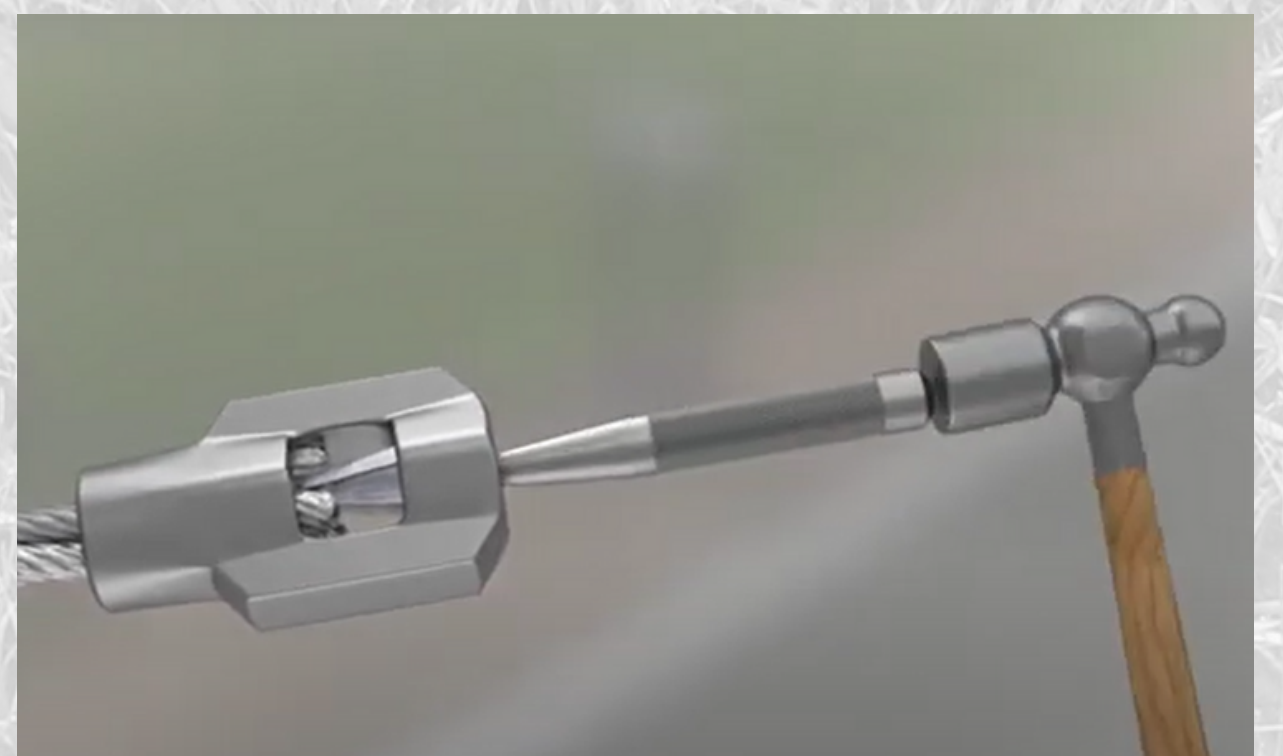
2) Using two flathead screwdrivers, separate the 3 strands of the cable at the end. Place and insert the triangular wedge between the cable strands. The triangular wedge must point toward the cable. The strands will fit in the grooves of the wedge.



3) Remove the screwdrivers and move the acorn up the cable until the wedge and cable are in the acorn as far as they will go.



4) With a hammer and punch, drive the wedge into the cable at least 3/8", but no more than 1/2" past the end of the cable.

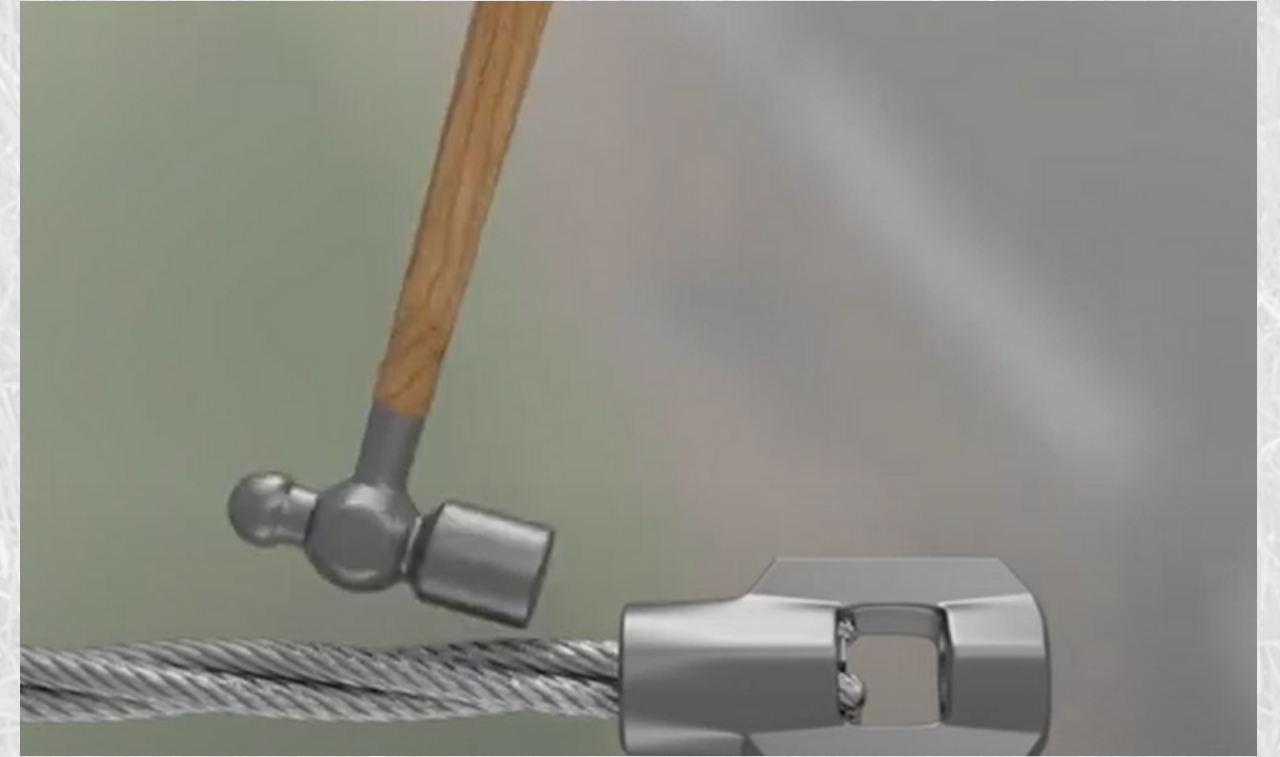




ANCHOR TERMINAL FITTING (CON'T)



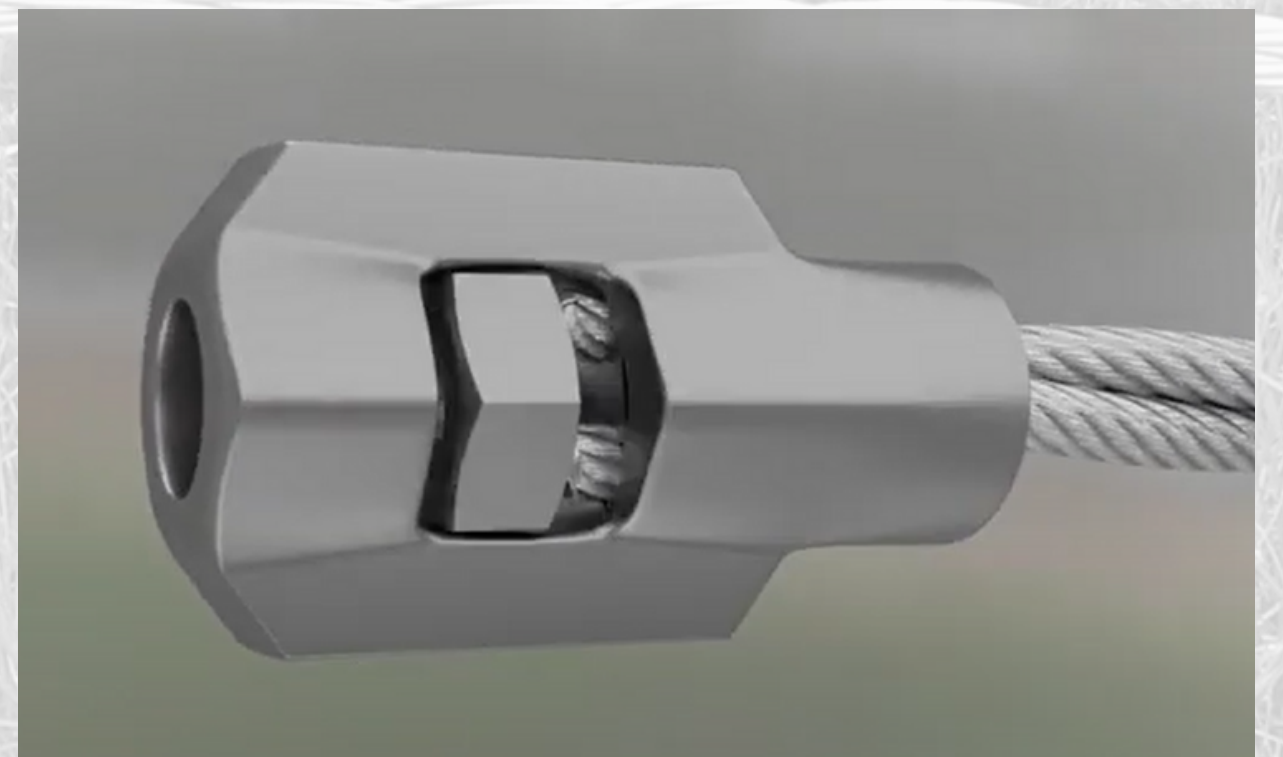
5) Drive the acorn up onto the cable until the top of the wedge is even with the bottom opening in the acorn.



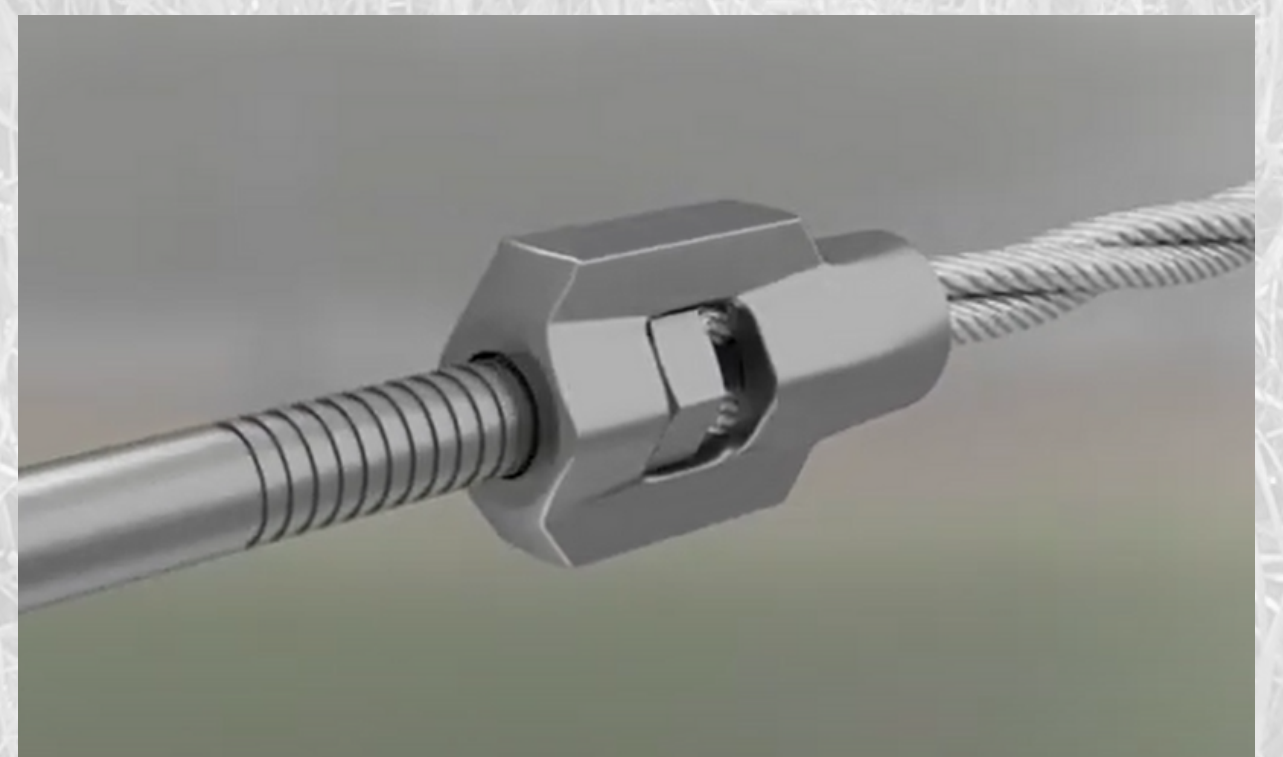
The 3 strands of cable should be nested in the grooves of the wedge.



6) Place the nut inside the opening of the acorn fitting and thread onto the threaded rod.



7) Connect the anchor terminal fittings with cable attached into the anchor post.





ANCHOR TERMINAL FITTING (CON'T)



Critical Points

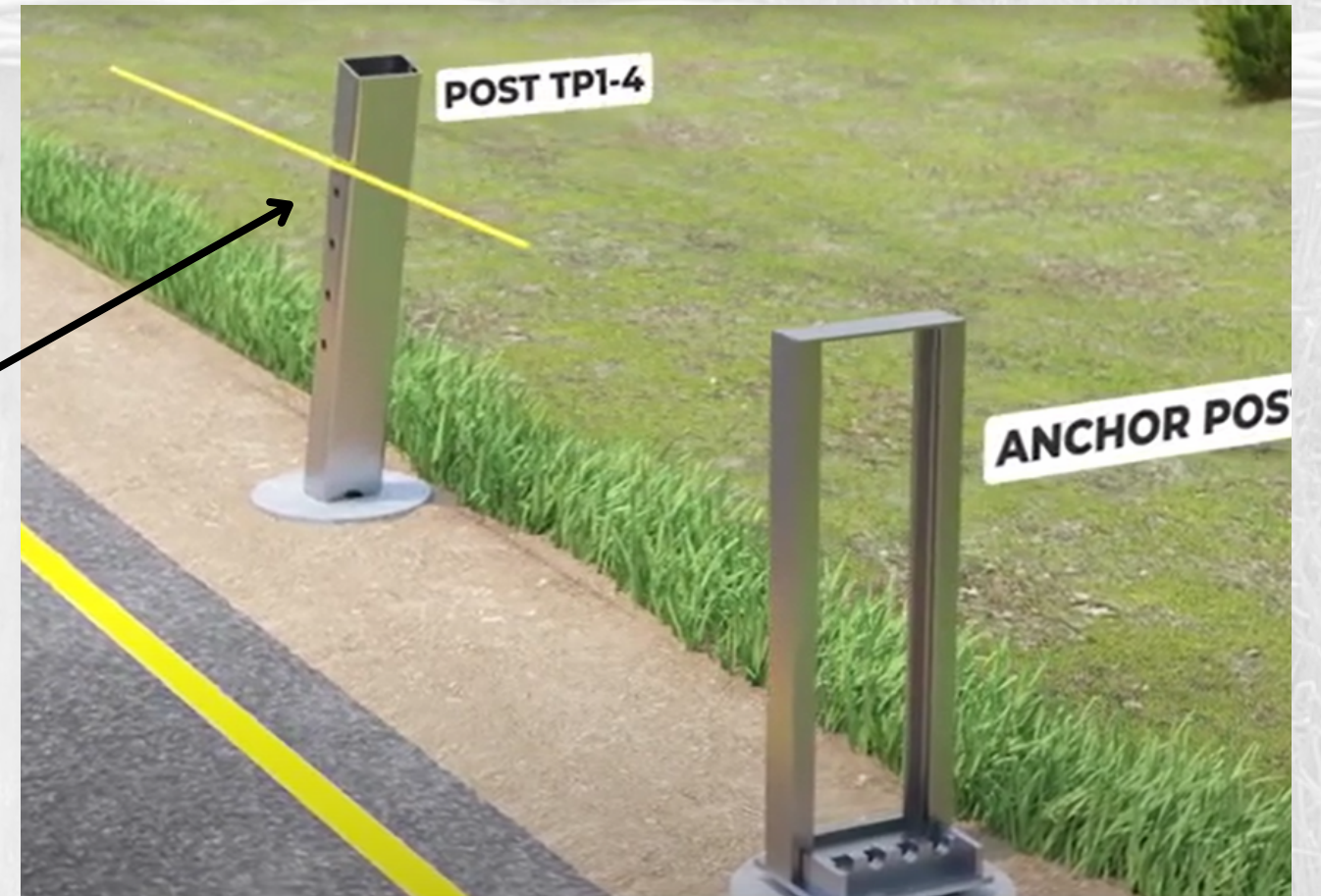
- Cable should extend $\frac{3}{8}$ " to $\frac{1}{2}$ " past the end of the wedge.
- Top of the wedge should be even with or below the bottom of the opening in the acorn.
- Individual strands of cable should be in the grooves of wedge, and bundles should still be round.
- Install cable release post as shown with 1" plate on bottom and the side with two bars towards TP1-4.



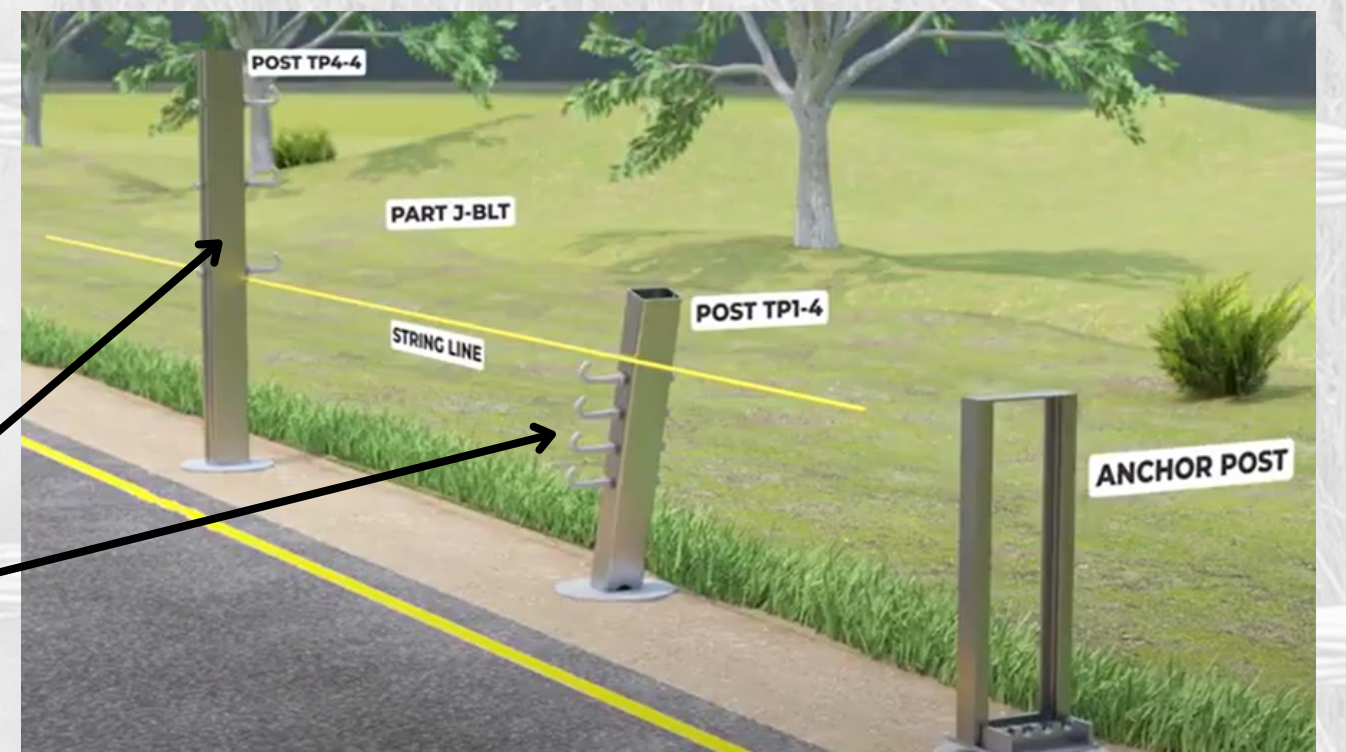
TERMINAL ABOVE GROUND



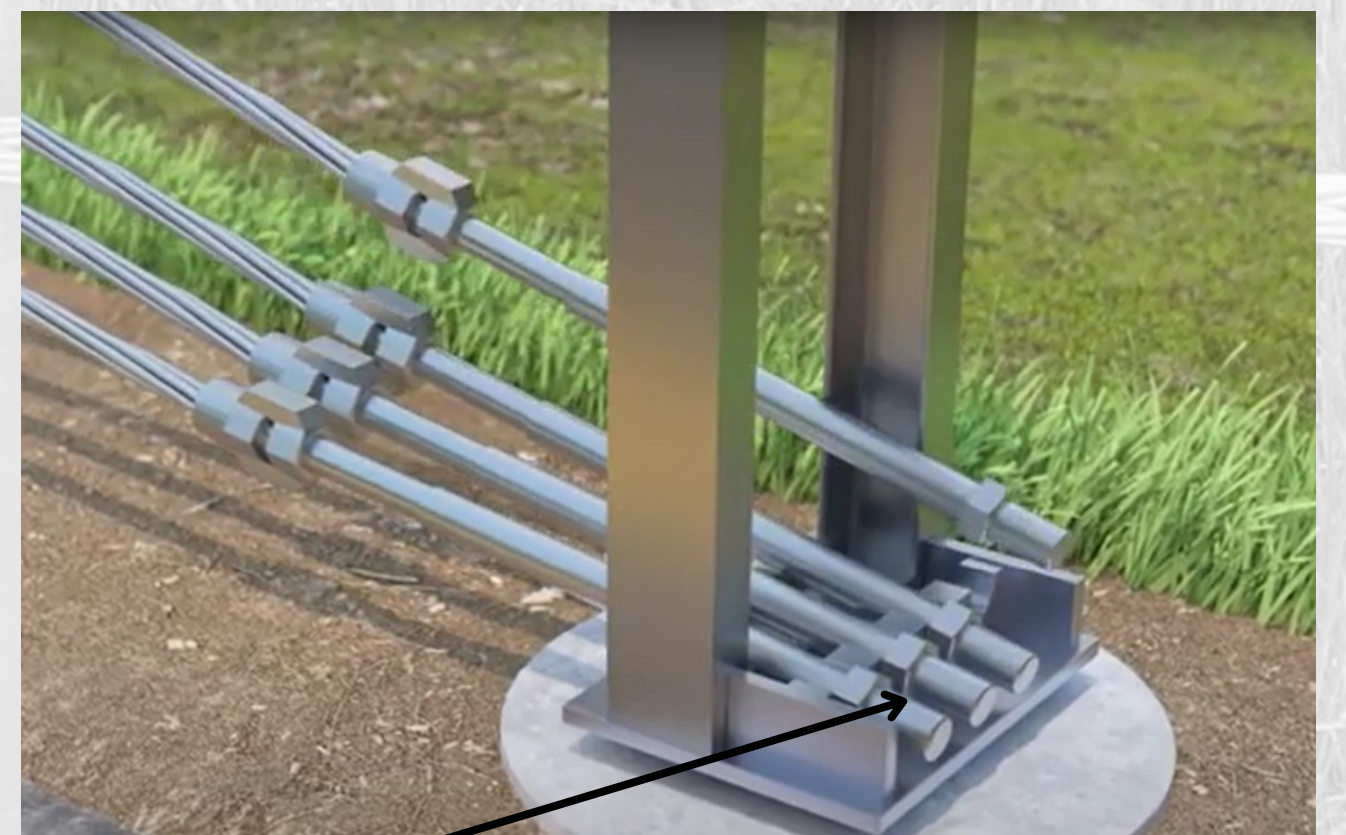
1) Set the cable release posts on top of the anchor post. Place a TP1-4 post in the first socket after the anchor post. Make sure the holes in the side of the post are towards the cable.



2) Place a TP4-4 post in the second socket after the anchor post, making sure the holes in the side of the post are towards the cable. The two terminal posts should be on opposite sides of the cable. Install the J-bolts into the two terminal posts.



3) Place 4 anchor terminal fittings with the cable attached into the slots of the anchor posts. Cables should be placed into the slot starting with the bottom cable and ending with the top cable. It does not matter which side installation is started on. There should be at least 2" of threads passing the nut on the anchor terminal fittings.



4) Place four cables into the J-bolts of the terminal post noting the top tables of the TP4-4 post will have two cables resting in it.





TERMINAL ABOVE GROUND (CON'T)



Critical Points

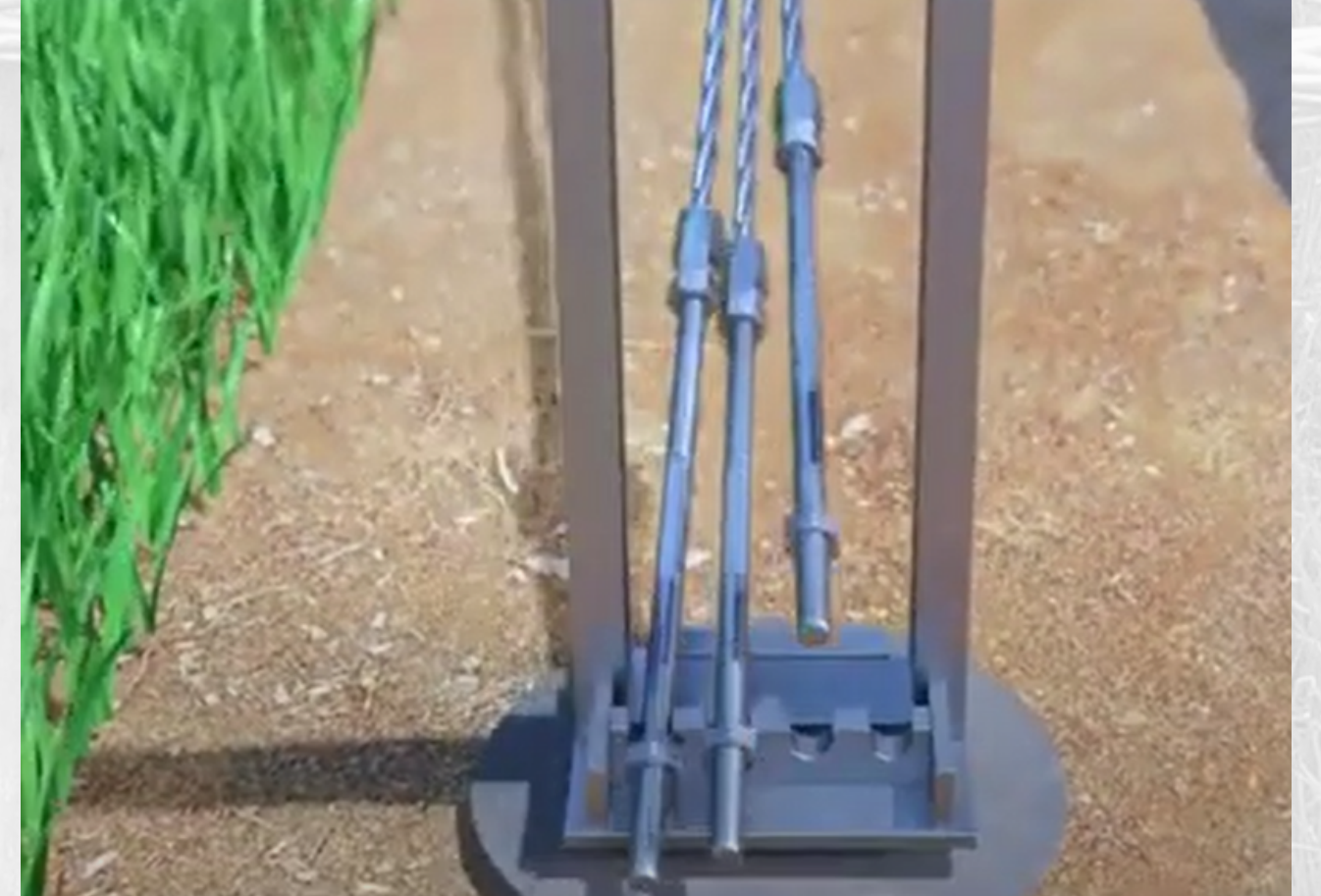
- Correct terminal posts in correct locations.
- Holes in terminal posts should be facing the cable.
- Cables placed in the slots of anchor post starting with the bottom cable.
- 2" of thread past the nut is for ease of installation. Only a full nut of threads is necessary for operation. More than a full nut is acceptable.



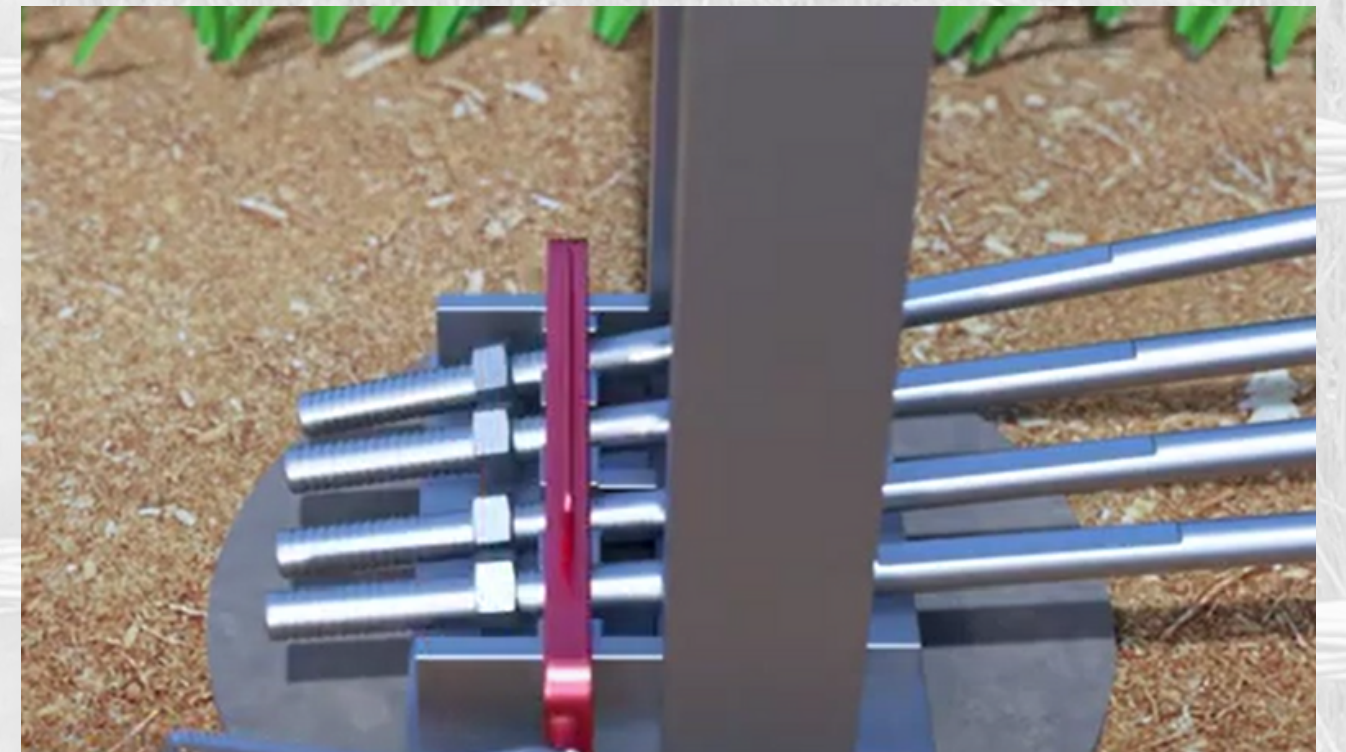
CABLE DISTRIBUTION



1) Start by connecting the anchor terminal fittings with cable attached into the anchor post.



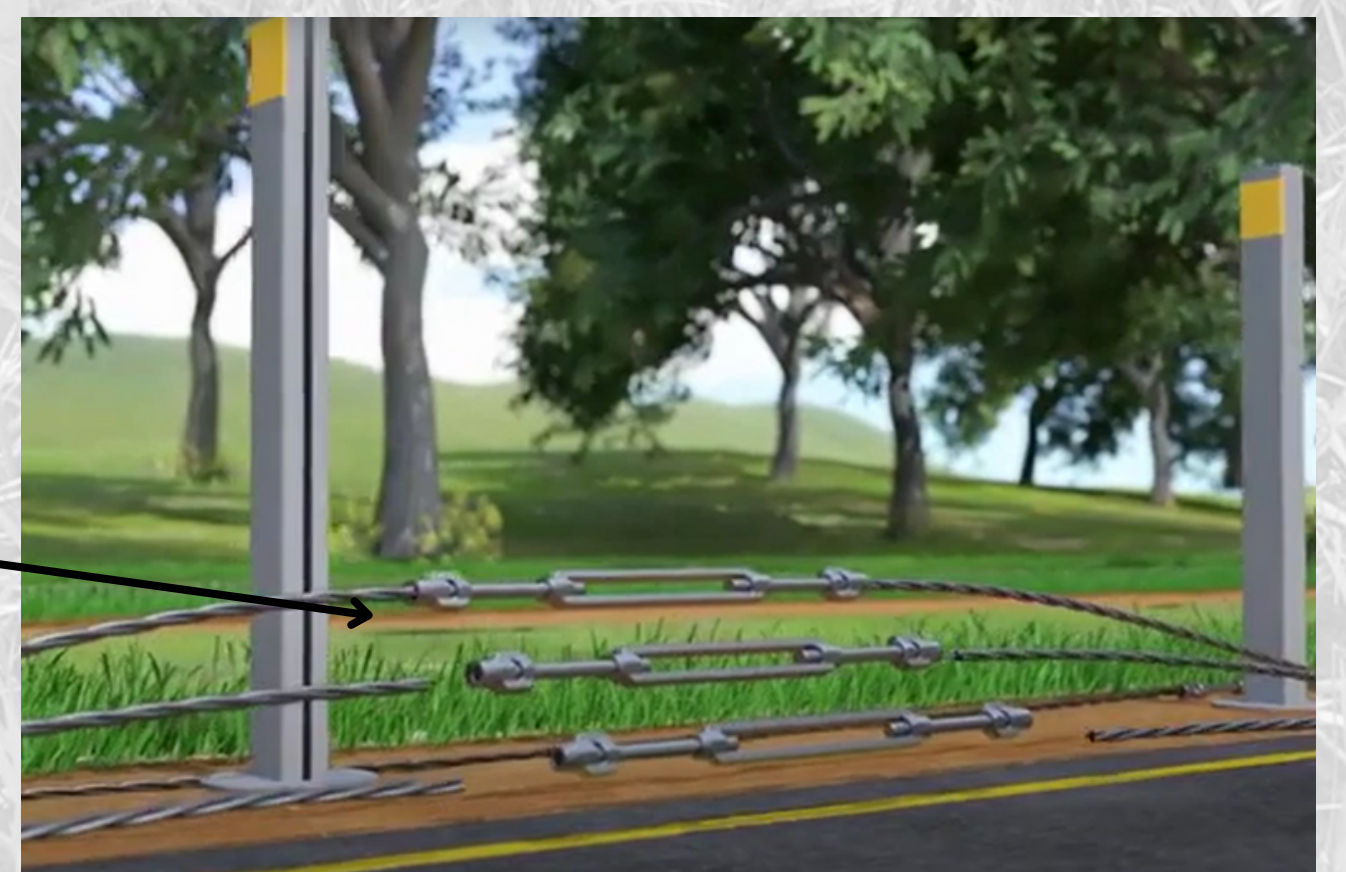
2) Once the anchor terminal fittings are placed in the anchor post slots, install an ATF retaining tool. This retainer will keep the ATF fittings from working out of the slots while the cable is distributed.



3) Distribute the cables throughout the run with three cables on the side of posts that the system will be hung from and one cable on the opposite side of the posts.



4) Use a CSTB fitting to connect spools of cable together and remember to place the CSTB near a post so the fitting ends up between posts when the system is tensioned.

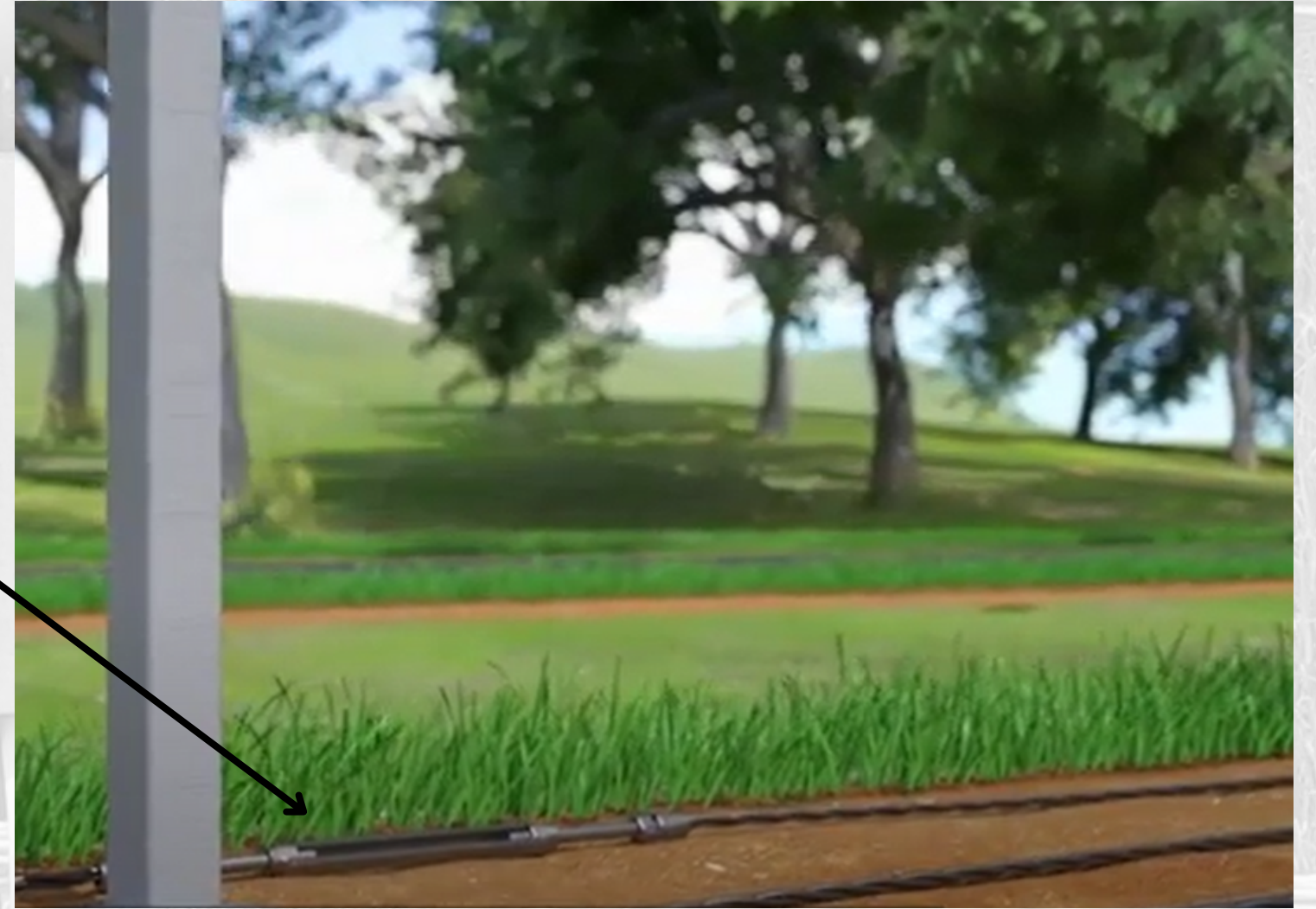




CABLE DISTRIBUTION (CON'T)



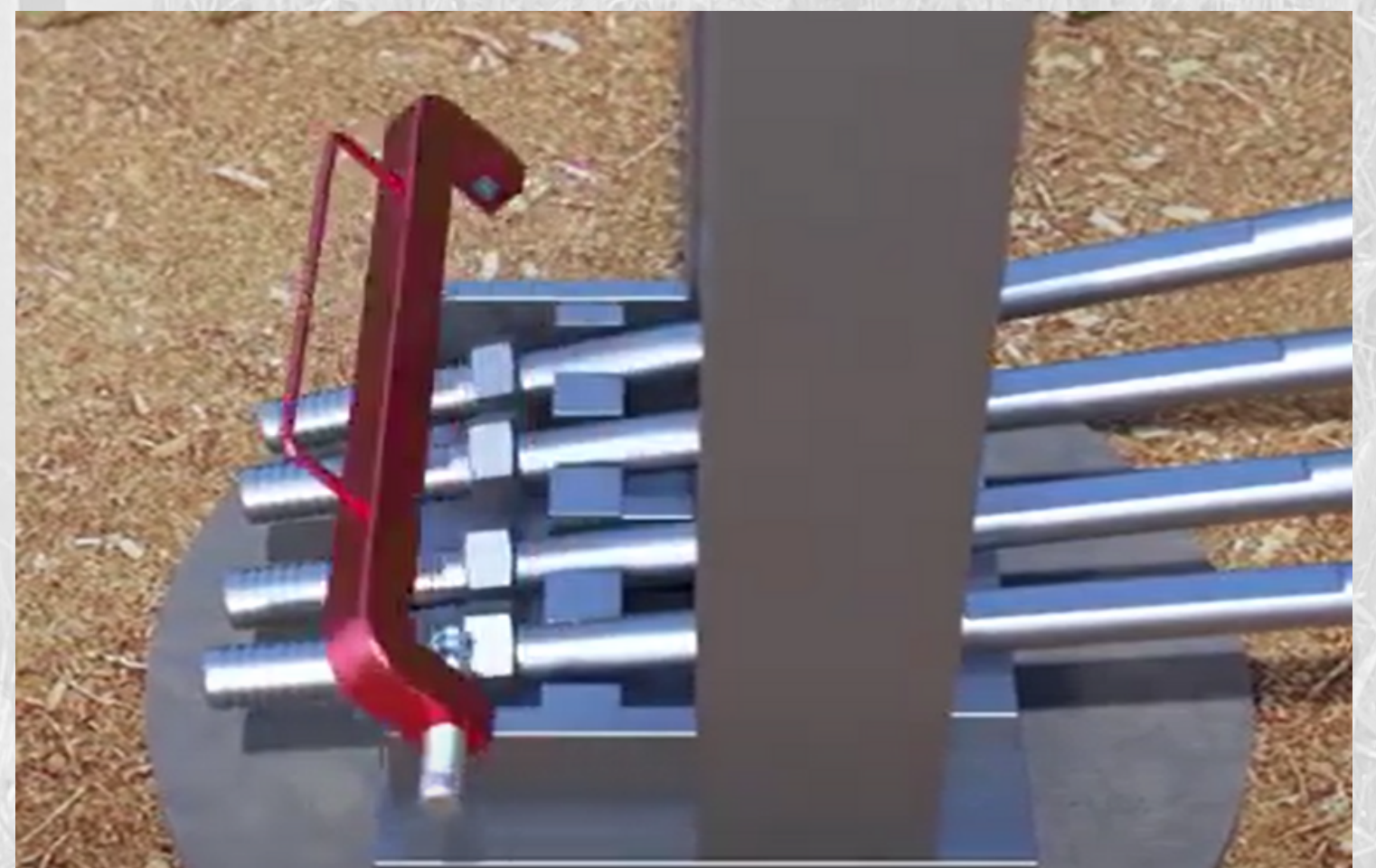
5) The fitting for the top cable should be placed near an adjacent post so that the top two fittings are not on top of each other.



6) Once the cable is tensioned, repeat this process until the end of the run is reached and leave the cable ends loose near the anchor post.



7) ATF retaining tool must be removed when crews are not present or not in use.





CABLE DISTRIBUTION

(CON'T)



Critical Points

- Place 3 cables on the side of the posts the cable will be hung from.
- Place 1 cable on the opposite side of the posts the cable will be hung from.
- The top fittings for the top two cables should be offset so the fittings do not sit on top of one another.
- Remove the ATF Retaining Tool when crews are not present or not in use.



CABLE INTERCHANGING



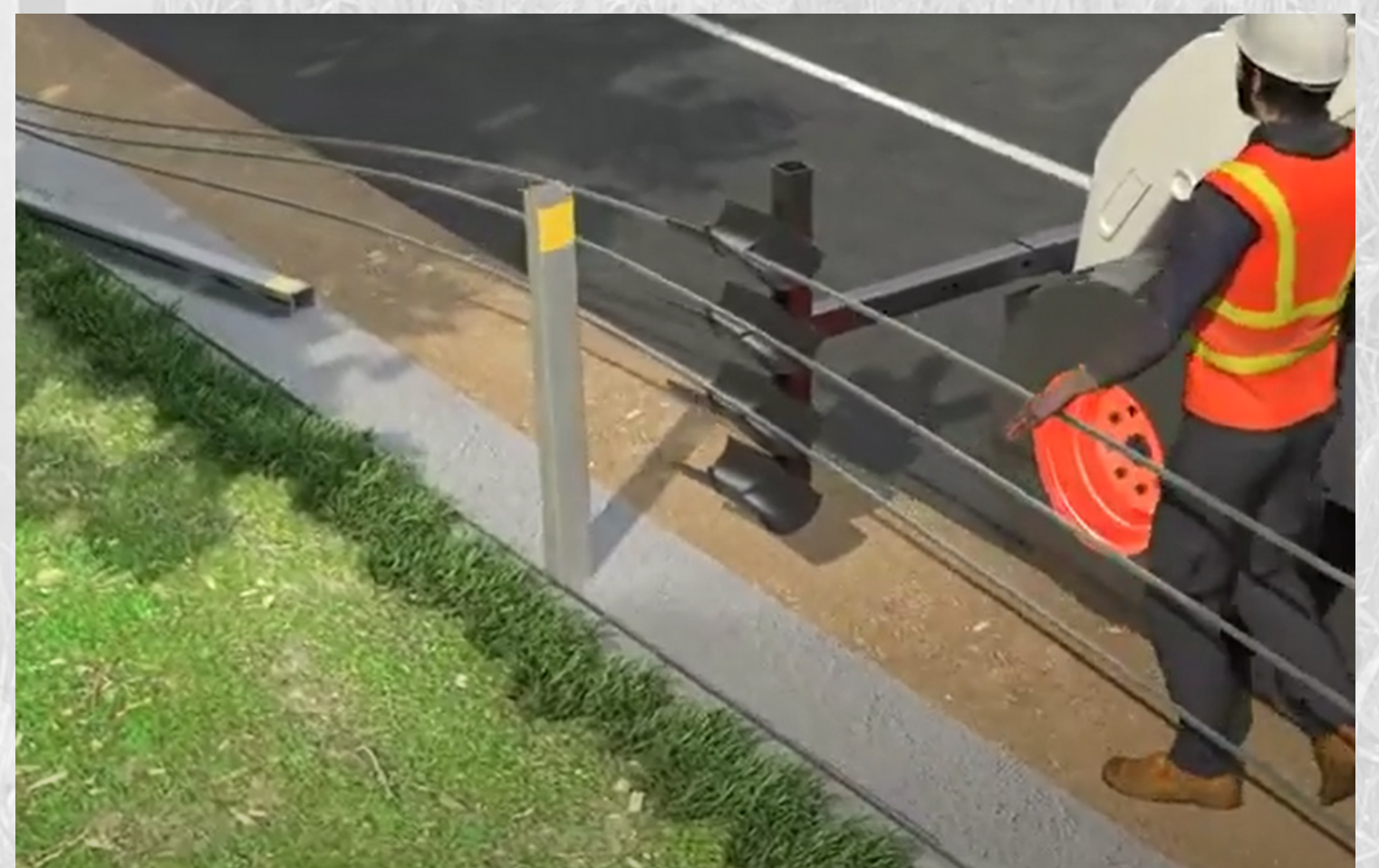
1) Start by placing only the posts where the slot is facing the side of the system the cable will be hung from. Other posts and hardware should be left out of sockets.



2) Hang three cables throughout the system utilizing a hairpin and lock plate. The fourth cable can remain on the ground.



This process is best performed with a cable hanging device to keep the 3 cables in the correct order.





CABLE INTERCHANGING (CON'T)



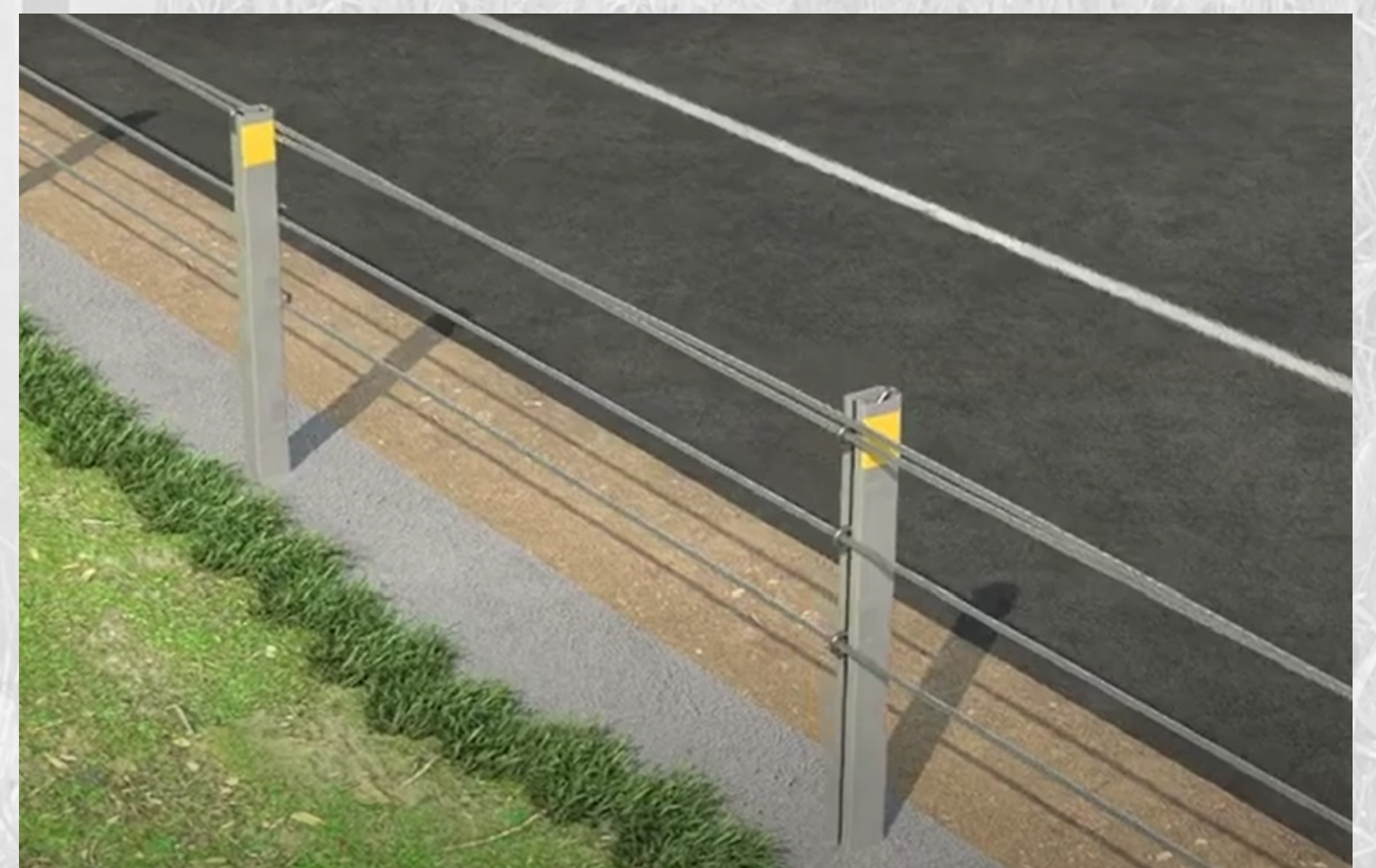
3) Tension the 3 cables that were hung up to the appropriate tension. At this point the remaining posts can be installed in the sockets.



4) The cables may be hung at this time with a fourth cable installed in the top loop of the hairpin and the third cable will be placed on top of the hairpin.



5) At the next post, the fourth cable will be placed on top of the hairpin. The top two cables will alternate going through the hairpin. They should never twist with the free cable at the post resting on top of the hairpin. After all the cables are installed, the fourth cable should be taken up to the appropriate tension.





CABLE INTERCHANGING (CON'T)



Critical Points

- Top two cables should alternate going through the top loop of the hairpin. They should never twist.

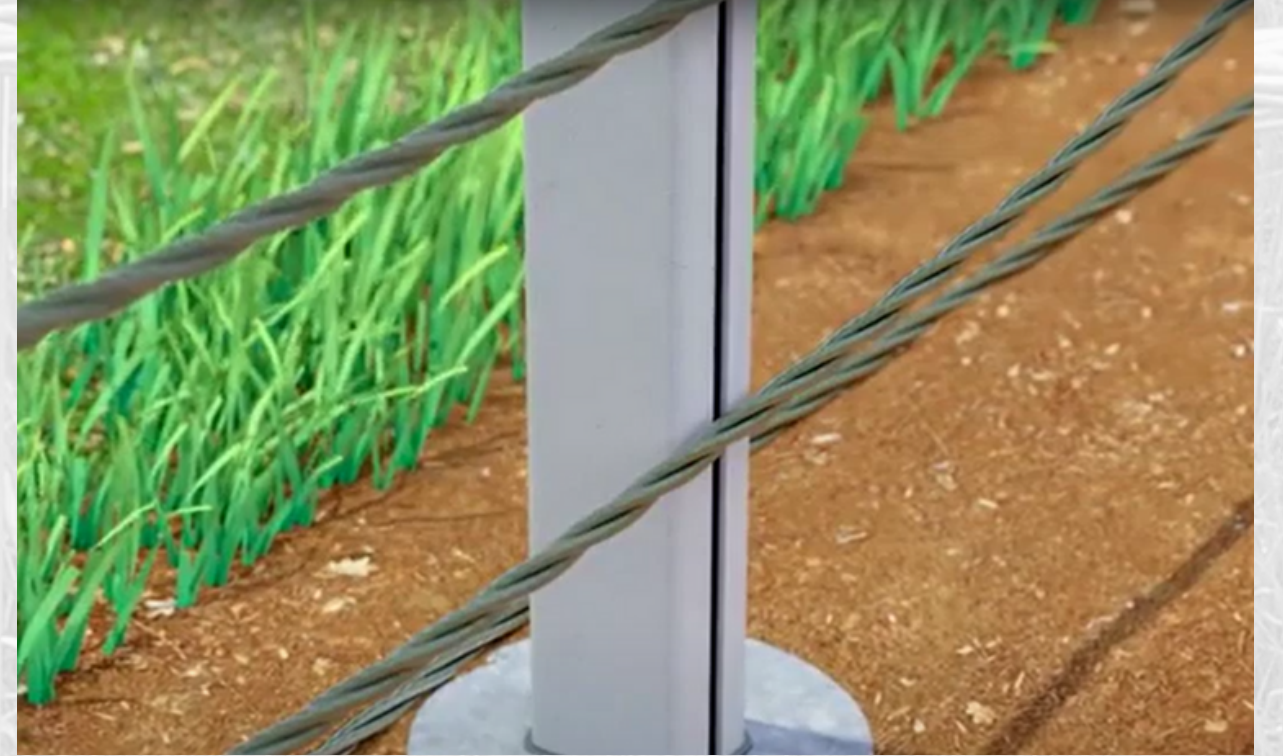
Cable Tension Chart	
-10°F	8600
0°F	8200
10°F	7800
20°F	7400
30°F	7000
40°F	6600
50°F	6200
60°F	5800
70°F	5400
80°F	5000
90°F	4600
100°F	4200
110°F	3800
* Allowable Deviation from Chart +/- 10%	



POST HARDWARE INSTALLATION



1) Slide a post into the socket with 3 cables on the slot side of the post and the fourth cable on the backside of the post.



2) Install a hairpin by inserting the base of the hairpin into the post and rotate the hairpin up until the cables are in the loops of the hairpin.



3) Slide the cables and the hairpin up to the post keeping the hairpin top leg in contact by pushing on the loops of the hairpin. This will keep the cables in the loops as the hairpin and cables are slid up the post.



4) Once the top leg of the hairpin clears the top of the post and goes over the post, the assembly can be released and the cables are hung at this time. Bring the fourth cable over the back of the post to the slot side of the post.

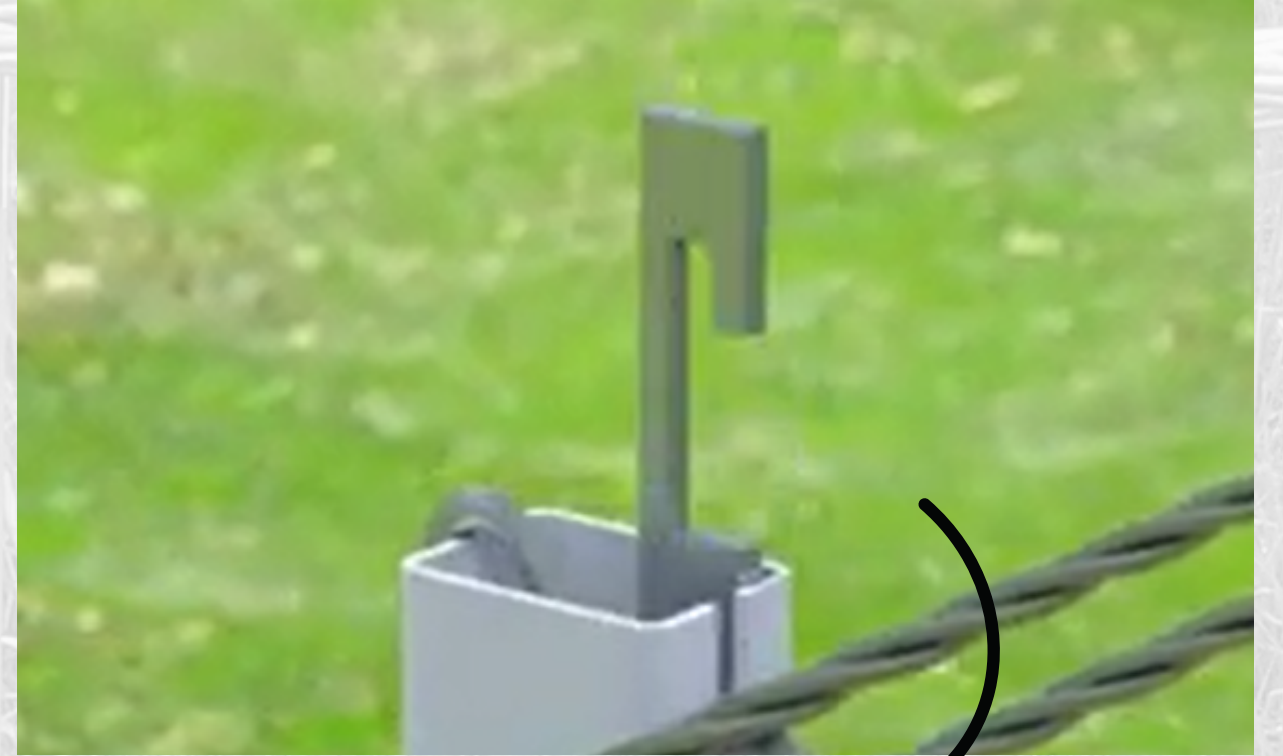




POST HARDWARE INSTALLATION (CON'T)



5) Install lock plate as shown, then rotate clockwise.



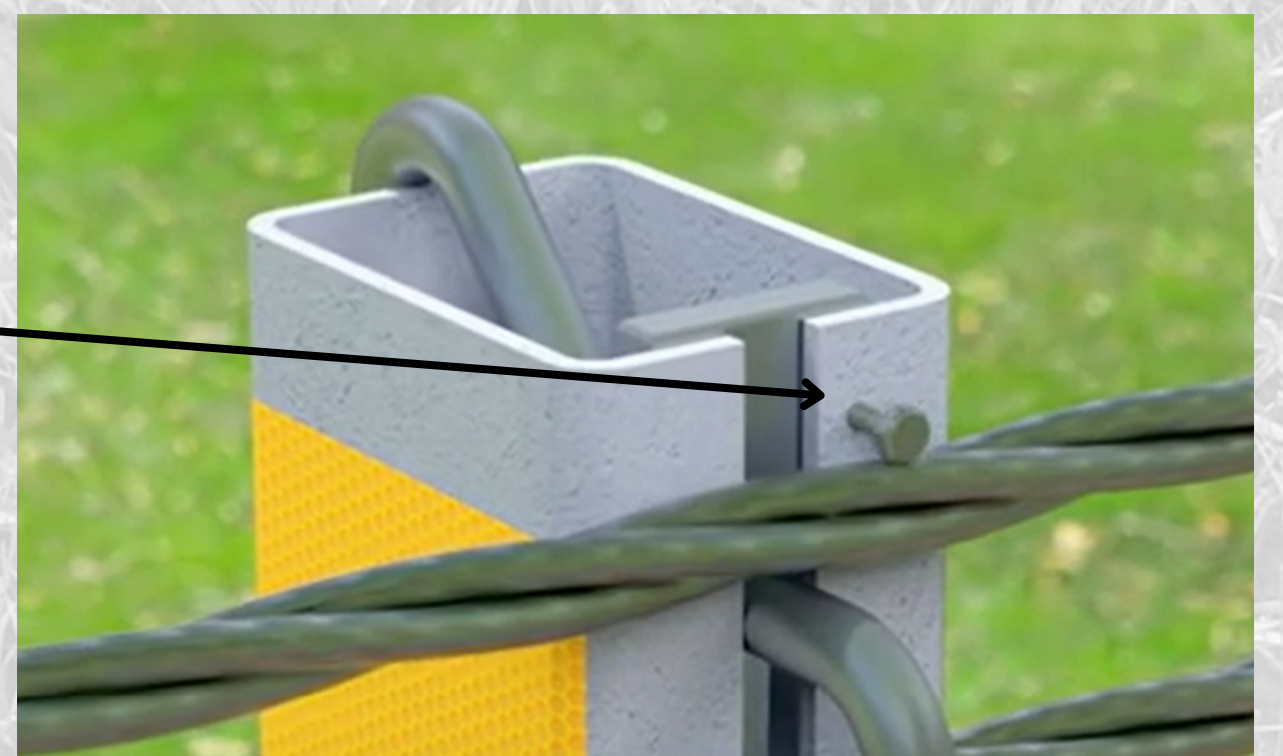
6) Place delineation on the post using the correct color for barrier location and at the project delineation spacing.



7) In certain cases, because of the terrain, the cables may be too high.



This is corrected by pushing the cables down to the correct height and using a #12 x 3/4" self-drilling, self-tapping screw. Install the screw through the post and into the lock plate to hold the cables at the correct height.

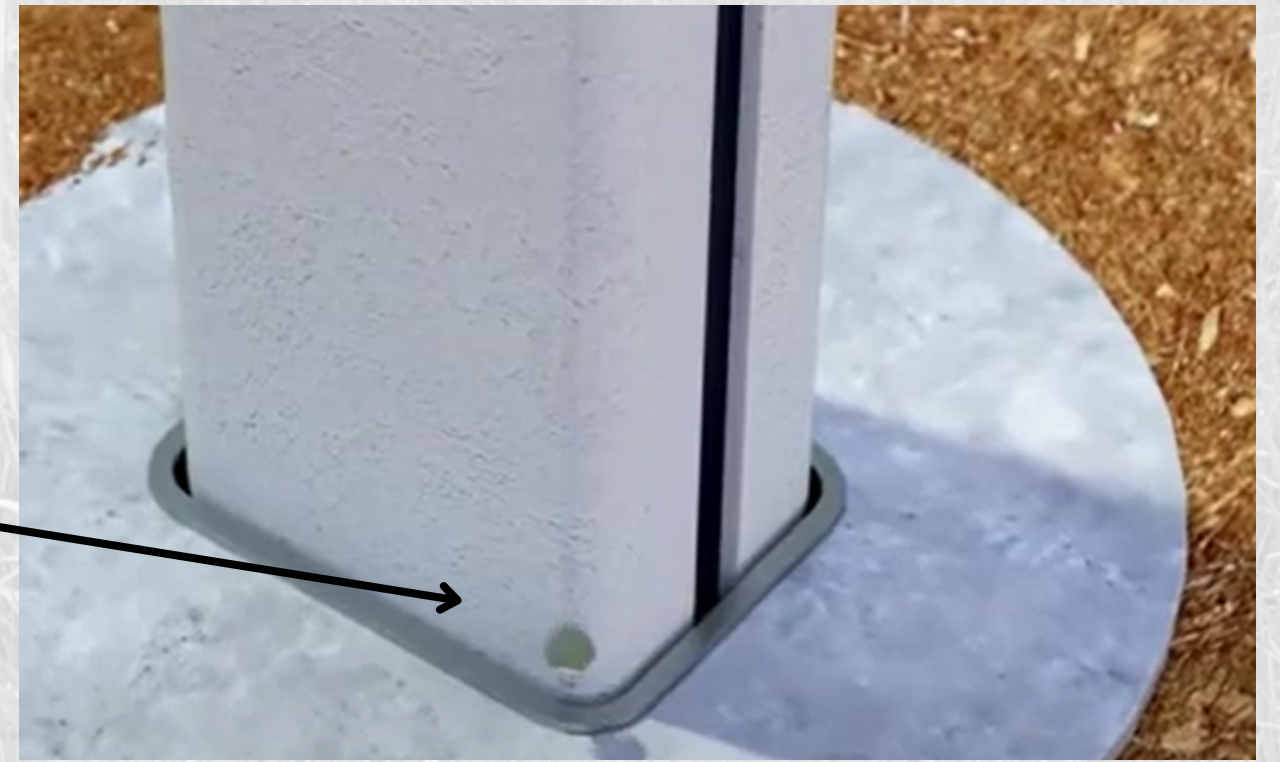




POST HARDWARE INSTALLATION (CON'T)



8) If the entire assembly is being raised out of the socket, push the assembly down into the socket and use a #12 x 3/4" self-drilling, self-tapping screw installed vertically between the post and socket to hold the entire assembly down at the correct heights.



Critical Points

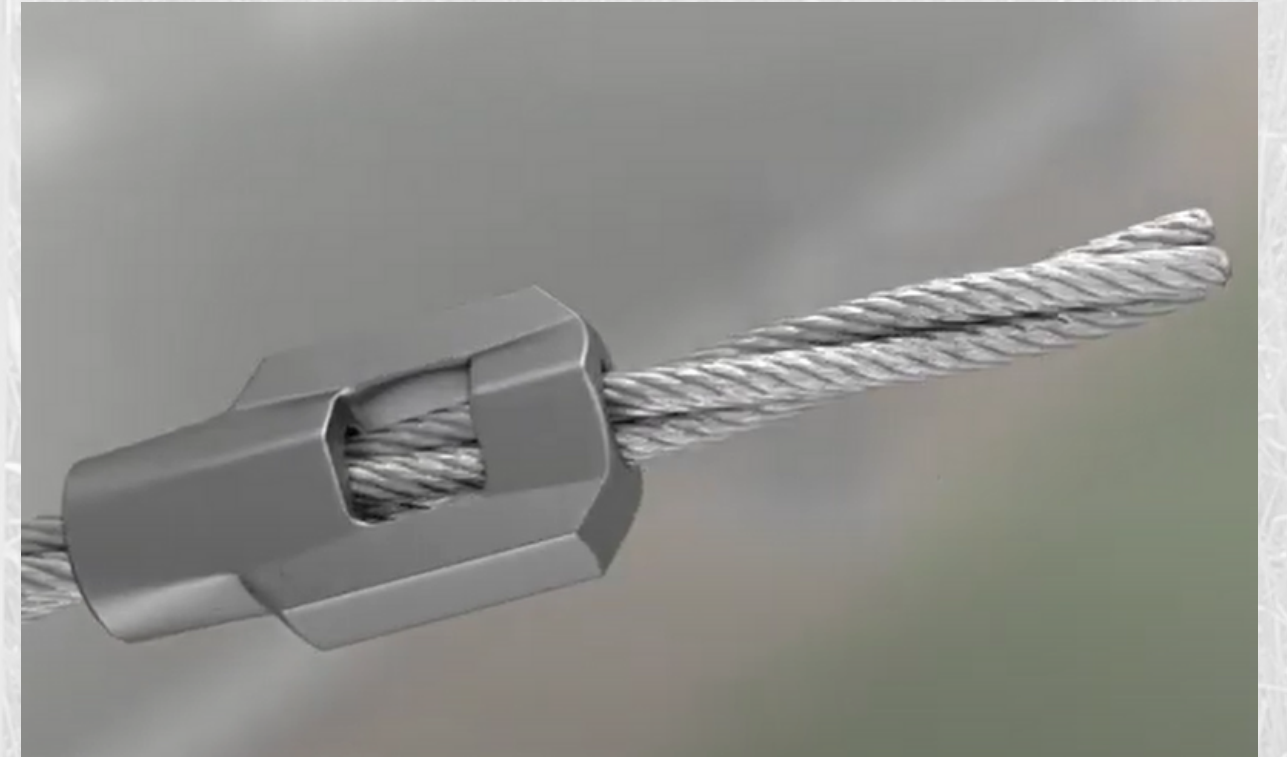
- Hairpin and lockplate installed at every post.
- The 3 cables in the hairpin should be at the correct height when measured at the post.
- Use #12 x 3/4" self-drilling, self-tapping screws to hold posts and hardware to ensure cables are at correct height.
- Delineation installed per project specification.



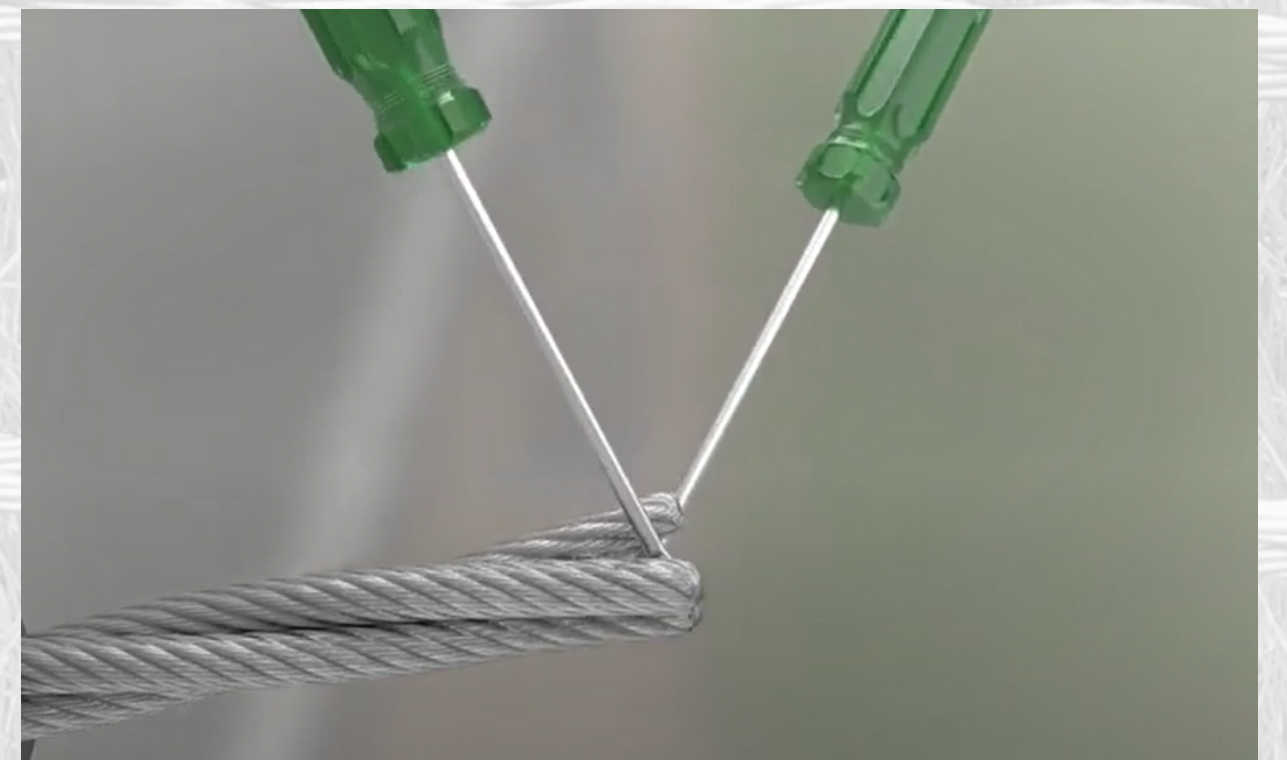
ACORN WEDGE INSTALLATION



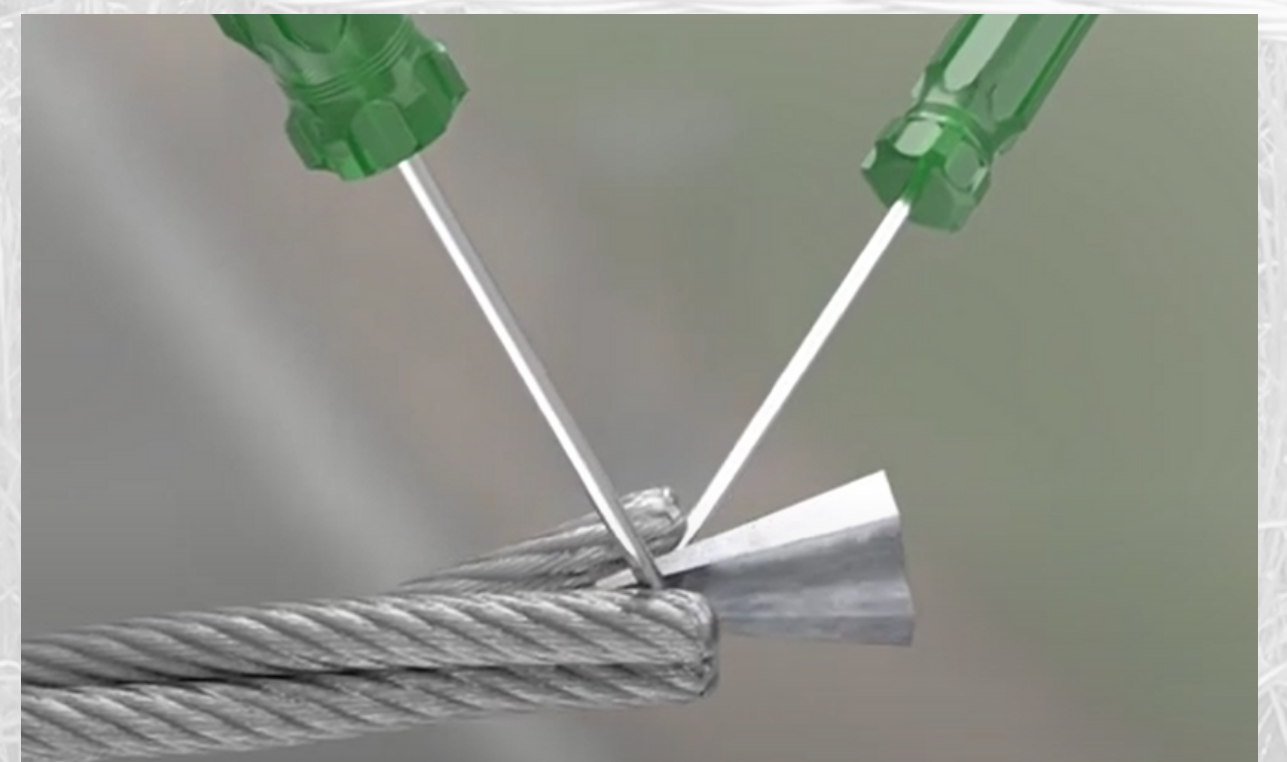
1) Start by inserting the cable ends into the acorn shaped casting.



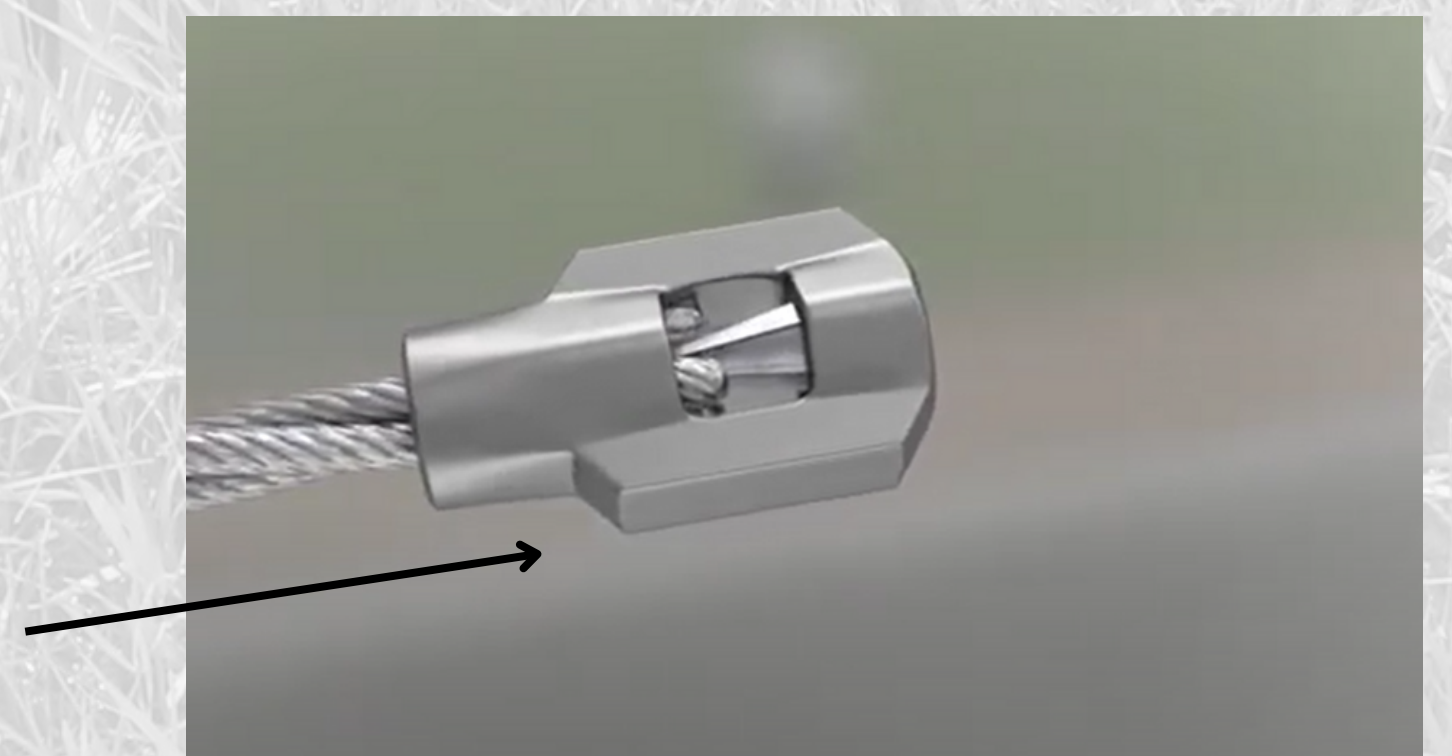
2) Using 2 flathead screwdrivers separate the 3 strands of the cable at the end.



3) Place and insert the triangular wedge between the cable strands. The triangular wedge must point toward the cable. The strands will fit in the grooves of the wedge.



4) Remove the screwdrivers and move the acorn up the cable until the wedge and cable are in the acorn as far as they will go.

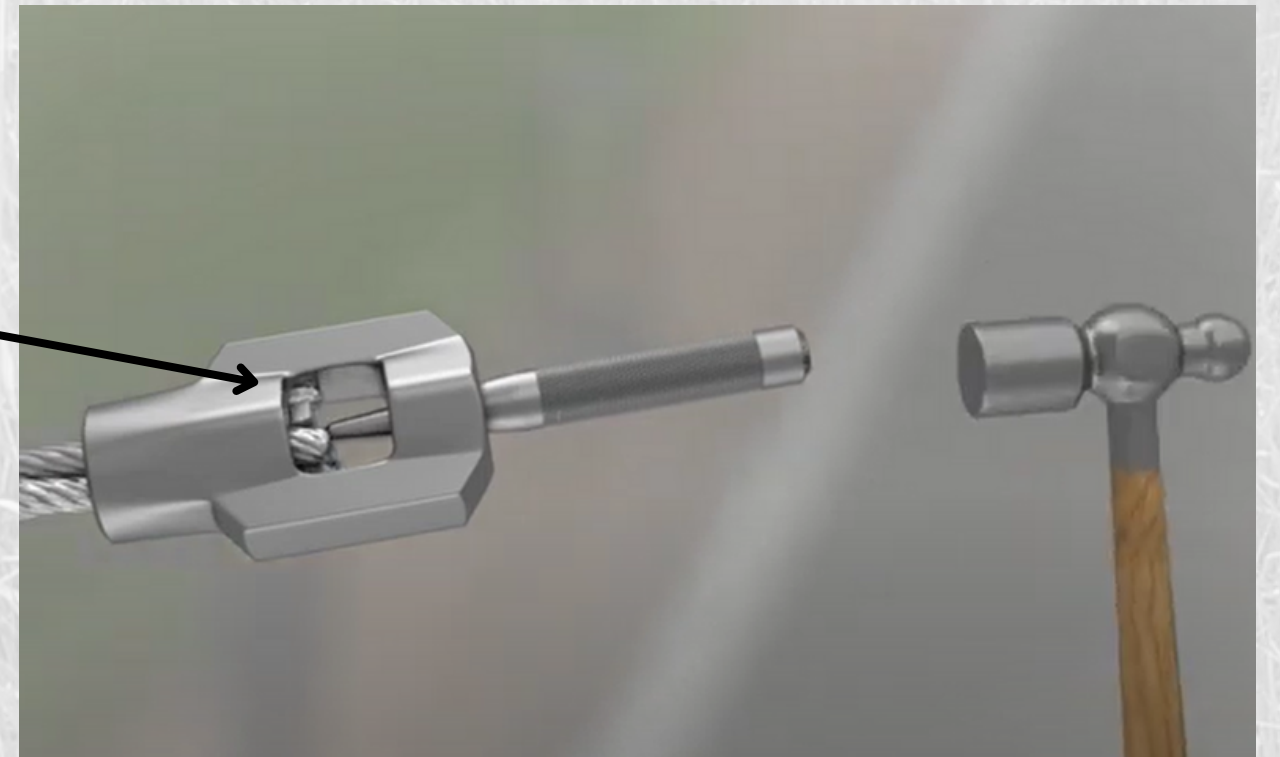




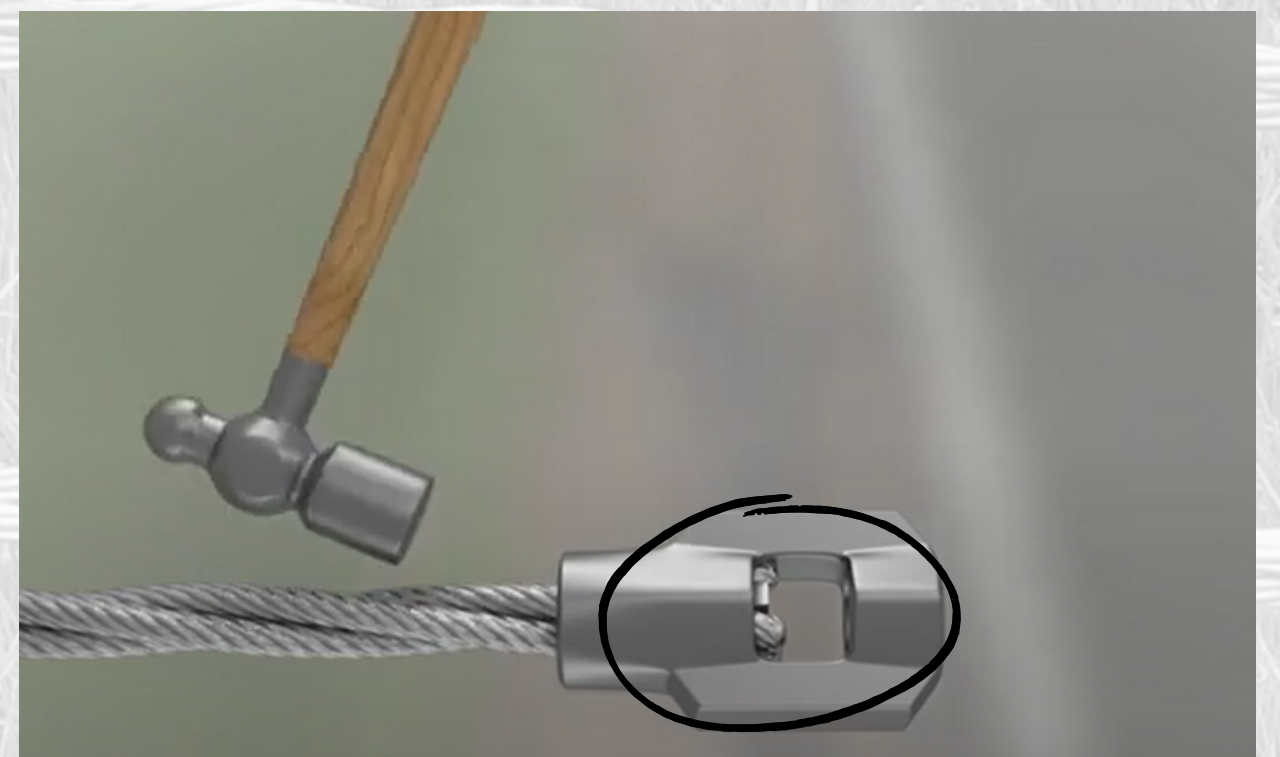
ACORN WEDGE INSTALLATION (CON'T)



5) With the hammer and punch drive the wedge into the cable at least 3/8" but no more than 1/2" past the end of the cable.



6) Drive the acorn up onto the cable until the top of the wedge is even with the bottom opening in the acorn.



7) The 3 strands of cable should be nested in the grooves of the wedge





ACORN WEDGE INSTALLATION (CON'T)



Critical Points

- Cable should extend 3/8" to 1/2" past the end of the wedge.
- Top of the wedge should be even with or below the bottom of the opening the acorn.
- Individual strands of cable should be in the grooves of the wedge and bundles should still be round.



SYSTEM REPAIR



1) When a portion of the system has been damaged, begin by removing the damaged post and replace with new posts.



2) Make sure that all the cables are on the correct sides of the posts. Make sure that the correct cable is on the top. The top cable should go through the hairpin on adjacent posts and cable should not twist.



3) Insert the cable separator tool between the top two cables. Rotate the separator tool and insert a separator block on either side of the post, then remove the separator tool, leaving the blocks in place.



4) Install a hairpin by inserting the base of the hairpin into the post. Rotate the hairpin until the cables are in loops of the hairpin and the hairpin is in contact with the back of the post. Slide hairpins and cables up the post keeping the back leg of the hairpin in contact with the back of the post until the back leg of the hairpin goes over the post.





SYSTEM REPAIR (CON'T)



5) Reinsert the separator tool between the top two cables, rotate the separator tool so the blocks can be removed. The separator tool can then be removed.



6) Insert the lock plate as shown and attach the delineation if required on this post.



7) If the cable height needs to be adjusted, use a self-drilling, self-tapping screw to hold the 3 cables in the hairpin at the correct height.





SYSTEM REPAIR (CON'T)



8) Repeat the process for the remaining damaged posts. Once the system has been repaired, use a tension meter to check and record the tension of all cables and adjust the tension if necessary.



CRITICAL POINTS

- Hairpin & lockplate installed at every post.
- The 3 cables in the hairpin should be at the correct height when measured at the post.
- Use #12 x 3/4" self-drilling, self-tapping screws to hold posts & hardware to ensure cables are at the correct height.
- Delineation installed per project specification.
- Tension for all cables is within an acceptable range and recorded.
Refer to the Adjusting Cable Tension video & Tensioning tab on the app or the tensioning chart in the Cable Distribution section of the manual.



CONTACT US

Technical & Sales Support

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info@gibraltarglobal.com

Installation videos available at:
<https://gibraltarglobal.com>
and on the
Gibraltar Global app.

