

COLORADO DIVISION OF WILDLIFE

# Building a Secure Beehive Enclosure



COLORADO DIVISION OF WILDLIFE  
Game Damage Prevention Program  
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# Protect Your Hives From Bears

The Colorado Division of Wildlife wants your bee hive operation to be successful. This publication will help you construct a secure enclosure. Besides protecting your hives, an enclosure also benefits wildlife – it keeps them away from human-produced sources of food and keeps them in the wild where they belong.

Bears are intelligent animals. Do not underestimate them. Well-constructed electrified enclosures are effective. However, if a bear gets into a yard because of poor construction or a system failure, it is often impossible to keep the animal out even after repairs are made. Bears can jump over fencing, nose underneath or use brute force to get inside.

Materials, parts list, and delivery are provided. For questions or final inspection by your local District Wildlife Manager, call: (970)252-6000

## Get some help

Beehive enclosures can be constructed by one person. But the job will be much easier with two or more people.

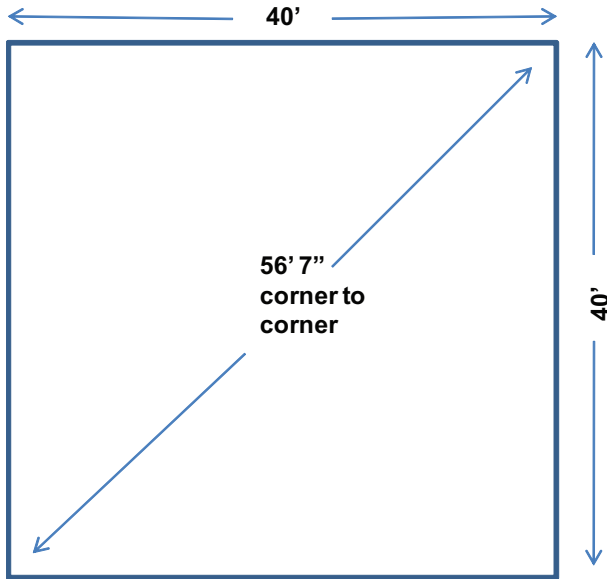
## What you'll need

100-foot tape measure (two if possible); work gloves; level; weed-whacker or lawn mower; herbicide; channel locks; pliers; needle-nose pliers; wire cutters; fencing pliers; large adjustable wrench; screwdrivers; electrical wire-stripping tool; metal hammer/mallet; surveyor's tape; fence stretcher; T-post driver; corner stakes - wood or metal; battery volt meter; electric fence tester; spool of twine 200 feet; weather-resistant box to hold 12-volt battery and charger - an old beehive box works well.

## Getting Started

Pick location for the enclosure. Select a level area that can accommodate a 40' by 40' enclosure. Consider ease of access for vehicles. Enclosures can also be built at 20' by 20'.





**Setting Corners for 40' x 40' yard**

- Choose location for first corner and stake it. Then measure 56' 7" at a 45-degree angle to the opposite corner. Stake second corner.
- To set the third corner: From each of the two staked corners, measure to 40' at a 90-degree angle. Using two tape measures simplifies the measurement. When the tapes meet at 40' that indicates the corner will be square. Stake corner.
- Repeat the measurement on opposite side to set fourth corner. Stake corner.
- For a 20 x 20 yard: Diagonal distance is 28' 4".

**Setting the Corner Posts**

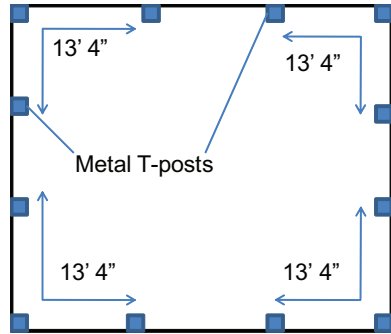
- Use a weed cutter or lawn mower to cut weeds and grass as low as possible along fenceline. Cut a 2'-wide strip. Grass that touches a grounded wire can short-out the system. If possible, use an herbicide to kill the plant material along the fence lines.
- Pound metal T-post in each corner. Knobby ridge points to outside; flange points on 45-degree angle to middle. Posts should stand as straight as possible. Use level. Set spade plate below ground level.



**Be careful with T-post driver! Concentrate and don't move too fast. People have hit themselves in the head, feet and legs with the post driver.**

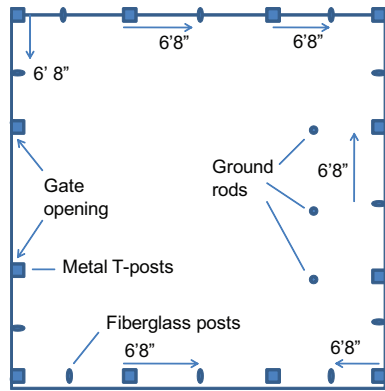
### Setting the Remaining T-Posts

- To set a guide for measuring, tightly tie the twine low to the ground around the corner T-posts. This marks the enclosure perimeter.
- Decide where the gate will be located. Consider vehicle access.
- Measure along twine 13' 4" from each corner post in both directions and mark the location with surveyor's tape.
- Pound in metal T-posts (8) at the marks, knobby ridge pointing out. Slide round PVC pipe covers over all 12 metal posts.
- Keep top of all posts at the same height as much as possible.



### Setting Fiberglass Posts

- Measure 6' 8" from each metal post in both directions and mark spot with surveyor's tape.
- Pound in fiberglass posts (11) at each mark between the metal posts. The 12th fiberglass post is used for a gate stay and is not pounded in.
- Holes drilled in the fiberglass posts must be above ground and be perpendicular to the fence line.



### Setting Ground Rods

- Inside and parallel to the fence opposite the gate opening, pound in three electrical ground rods. Rods must be at least 10' apart and 3' inside the enclosure. Pound in as deep as possible to maximize ground contact. The same distances apply for a 20'x20' enclosure.
- Rods can be buried if pounding them in is impossible.

### Attach Woven Wire to Posts

- Use fencing pliers to attach wire to posts.
- Start at one metal T-post at the gate opening and attach woven wire securely. Wrap and twist aluminum ties to attach woven wire to plastic covers.
- Use U-shaped aluminum clips to attach woven wire to fiberglass posts. Wire hangs on clips.





- Roll out woven wire a little at a time and stretch against posts as much as possible by hand.

### **Assembling the Gate**

- Gate opening is approximately 14'. Cut woven wire so that it can be stretched tight.
- In the middle of the gate, secure a fiberglass post to the woven wire. The post will act as a stay to keep the gate standing. Do not pound into ground.
- For the gate opening, attach 6 spring-loaded black handles on one end of fence. Handles are plastic and will not conduct electricity.



### **Installing Corner Brace Kit**

- Corner braces tighten the structure. **See photo on next page.**
- Use corner braces provided. Complete instructions included in Speed Brace kit.
- Place each corner brace attachment over corner T-posts.
- At a 45-degree angle inside the fence corner, attach second T-post to the corner brace.
- Place small board, tile, or rock on the ground. Place angled T-post on top.
- Wrap rusty wire (provided) around bottom of corner post and attach to bottom of support post. Use plenty of wire to allow for tightening. By twisting the wrap of wire together the fence will be pulled tight.

- Repeat in other three corners.
- Check gate; tighten section if necessary.

### Attaching Barbed Wire

- Start at one end of gate opening and attach one strand of barbed wire directly to metal T-post about 6" above the woven wire. Use a T-post clip
  - Pull barbed wire as tight as possible and secure to every T-post with T-post clips. Best to use a fencing tool.
  - Use U-clip to attach to fiberglass pole. Do not allow the U-clip to touch the woven wire clip below.
  - Attach a second strand of barbed wire 6" - 12" above the first.
- Barbed wire must also be placed over the gate.



- A grounded strand of barbed wire can also be placed on the bottom of the fence to provide extra security. Bears and other animals can crawl under fences.
- All barbed wire is grounded.

### Lay Out Electrical Components

- Place box that houses battery and charger at least 3' inside the fence near the middle ground rod. Box is not included with materials supplied by DOW. An old hive box is the ideal size.
- Cut a hole for the lead out wires. The hole also provides a vent for battery gases.
- Two lead-out cables: one for positive connection; one for negative connection.
- See directions in the Parmak charger package.





### **Making the Connections**

- This photograph shows how all components should be connected.
- With a volt meter, test the battery – it should read 12-14 volts. Battery is delivered charged.
- Connect positive and negative wires from the solar panel and the charger to the battery terminals.
- The battery-pole clamps are included with the charger kit.
- Lead-out cable lengths from the charger must be long enough to reach the closest ground rod and barbed wire from the negative connection, and the woven wire from the positive connection.

### **Attach Ground Wires**

- One end of lead-out cable is connected to negative/ground terminal of the charger. Cable is then attached to the ground rods and the barbed wire. Strip insulation at ends and at location where the lead-out cable will connect. Use clamps to attach to wire and ground rods.



## Making Positive Connections

Attach lead-out cable to positive (red) terminal of the charger. Then, using connector clamps, attach lead-out cable at three locations to only the woven fence wire.

## Testing Voltage Output

Before connecting the charger to the woven wire, test output voltage by touching the electric fence tester probes to the charger. Voltage should be 7k to 10k. After testing, turn charger off and make positive and negative connections to the fence and ground rods. Carefully secure solar panel to top of the box. If not secure, the panel can be blown off by wind. Do not cover solar cells. Expose to sun as much as possible. Turn charger on. Replace top of box.



## Testing Output to Fence

- Check the output voltage at several locations using electric fence tester. Touch positive probe to the woven wire. Simultaneously touch negative probe at several locations, including barbed wire, ground rod and the soil.



- Voltage should read more than 7k to be effective. If less than 7k, troubleshoot the system and look for any uninsulated item touching the woven wire, for example: vegetation, U-clip ends touching, sagging barbed wire, sagging gate touching ground, etc.

**CAUTION: The gate is the easiest place to get shocked. To leave the enclosure, carefully open the gate by holding insulated handles.**

## Maintaining the Bee Yard

- Check the fence and charger thoroughly before placing the beehives.
- Check battery voltage regularly. It should read between 12 and 14 volts.
- Check water level in battery regularly.
- Use electric fence tester to check voltage output on enclosure regularly.
- Check the fence and charger regularly for damage.
- Remove vegetation near fence. A (load) short is caused when vegetation touches the fence.
- Clean off solar panel regularly. Dust interferes with operation.
- Disassemble and store electrical equipment after bears enter hibernation.
- Disconnect battery from solar panel.
- Keep equipment at a moderate temperature and keep battery charged. Use a battery tender to prevent overcharging.
- If location is in an area that receives lots of snow, disassemble fence after bears enter hibernation. Posts can be left in place.
- Questions: Call DOW Game Damage at (970)252-6000.