



## Low Investment Propagation/ Winter Protection Structure

### Basic Structure

#### Quonset design:

- 3' high × 6' wide × 20' long
- $\frac{3}{4}$ " schedule 40 PVC pipe bows slipped into  $\frac{3}{4}$ " electrical conduit hangers
- 6 mil white copolymer cover
- 2" × 8" treated lumber kickboards along sides and ends
- $2\frac{3}{4}$ " wide batten tape to hold plastic to kickboard

### List of Structural Materials and Approximate Costs (2012)

Description	Quantity	Unit Cost	Extended Cost
$\frac{3}{4}$ " PVC SCH 40 pipe, 20' lengths	4	5.08	20.32
12' × 30' white copolymer film, 6 mil	1	30.00	30.00
$\frac{3}{4}$ " electrical conduit hangers	32	0.57	18.24
2" x 8" × 12' treated lumber	1	11.97	11.97
2" x 8" × 10' treated lumber	4	11.00	44.00
16 penny common nails	1 lb	4.27	4.27
16 gauge steel wire, 200 ft. roll	1	9.82	9.82
Roofing nails	1 lb	1.66	1.66
4" × 5" metal mending plates	4	1.25	5.00
$2\frac{3}{4}$ " batten tape, 100 yds.	1	21.00	21.00
<b>Total</b>			<b>\$166.28</b>

### Tools Required for Construction

- |                      |                      |
|----------------------|----------------------|
| Chop saw or hand saw | Garden rake          |
| Hammer               | Side-cutting pliers  |
| Tape measure         | Knife                |
| Round-pointed shovel | Builder's square     |
| Pencil               | Stapler with staples |

## Site Selection

Choose a site for your structure that is fairly level and preferably has some shade. If the structure is to be used exclusively for propagation, it should be oriented east-west. If its primary use will be in providing winter protection for nursery crops, it should be oriented north-south. There should be a water source nearby because water is needed for both propagation and winter protection. Drainage from the area should be sufficient so that pots do not sit in water in winter or summer, especially after light rains. For frost protection, the site should not be located in a low-lying area that collects cold air draining to it at night. An evergreen windbreak would reduce wind buffeting in winter, which both reduces the heat lost from the structure and increases the life of the plastic.

## Construction

1. Level an area (properly oriented depending upon whether your structure will be used for propagation or winter protection) 6' wide  $\times$  20' long.
2. Square ends of lumber.
3. Cut the 2"  $\times$  8"  $\times$  12' in half so that you have two (2) pieces that are 2"  $\times$  8"  $\times$  6'. These 6' sections will be used for the ends of the bed.
4. Butt the ends of two (2) of the 2"  $\times$  8"  $\times$  10's together and nail securely using mending plates on both sides of the splice, so that you have a 2"  $\times$  8"  $\times$  20' piece.
5. Repeat step 4 using the remaining two (2) 2"  $\times$  8"  $\times$  10 pieces. The two (2) bed sides (kickboards) are now assembled.
6. Lay kickboard sides on edge 6' apart on the leveled area, and place a 2"  $\times$  8"  $\times$  6' section outside each end. Be certain that corners are square and then nail together securely. You now have a rectangular box with an open top and bottom that has inside dimensions of 5' 8 $\frac{3}{4}$ "  $\times$  20'.
7. At each of the four (4) corners along the length of the structure (on the inside edge of the kickboard), nail in a conduit connector so that the top of the connector is flush with the top edge of the 2"  $\times$  8"  $\times$  20' piece. Any nails that come through should be bent over so that they will not tear the copolymer cover.
8. Repeat step 7 but with the bottom of the connector flush with the bottom of the 2"  $\times$  8"  $\times$  20' kickboard.
9. Starting from the center of either of the top conduit hangers, mark off the kickboards along the length of the structure at 33 $\frac{13}{16}$ " intervals. Including the two end conduit hangers, there will be eight (8) total on the top of each kickboard.
10. At each of the marked intervals nail in two (2) conduit hangers as in steps 7 and 8.

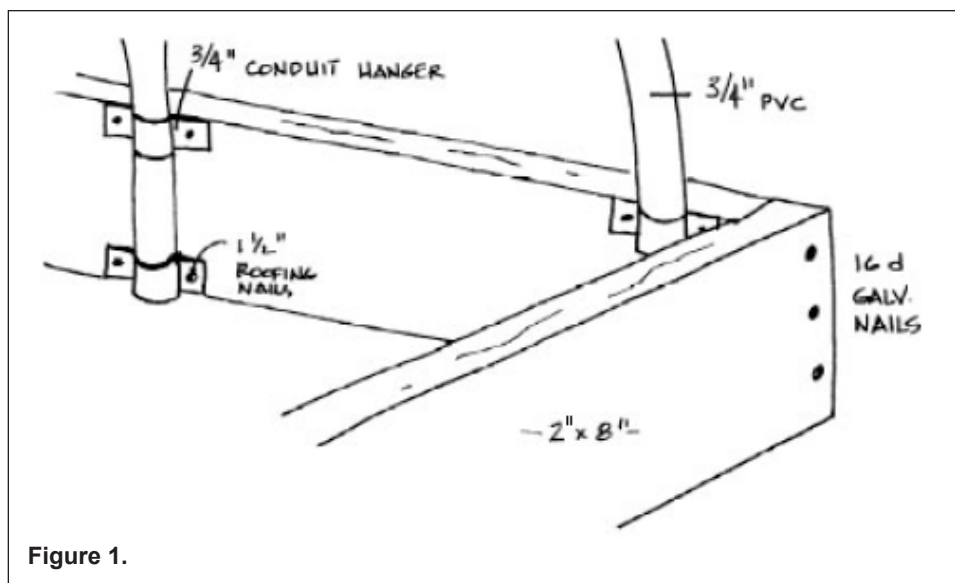


Figure 1.

11. Cut the four (4) 20' lengths of PVC pipe in half so that you have eight (8) 10' pieces.
12. For each section of PVC pipe, slip one end down through a set of conduit hangers, bend the pipe in a bow across the width of the structure and slip the other end of the pipe down through the opposite set of conduit hangers.
13. Install remaining 3/4" PVC bows as in step 12.
14. If the structure is going to be used for winter protection of containerized plants, follow steps 16 and 17 and then steps 20 through 23.
15. If the structure is going to be used for propagation of stem cuttings, follow steps 18 and 19 and then steps 20 through 23.
16. Place containerized materials inside the structure. More cold-tolerant plants, such as creeping junipers, should be placed around

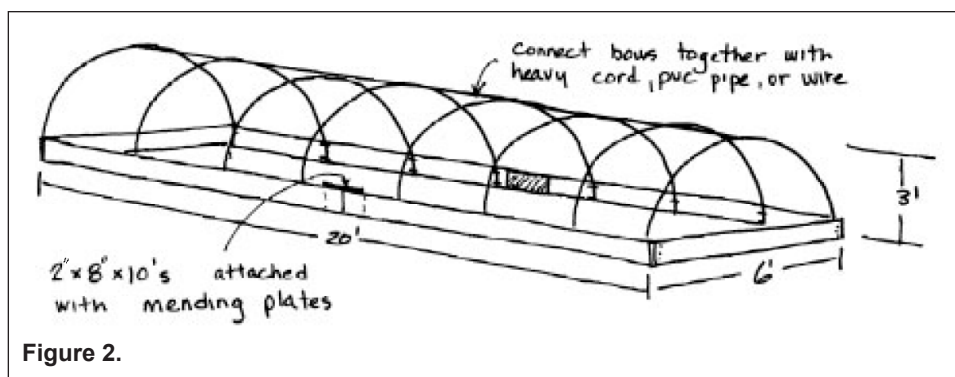


Figure 2.



the perimeter to act as an insulator. If area is prone to winter flooding, try spreading 2" to 3" of gravel as a base before placing plants into structure.

17. Water all containers thoroughly, then follow steps 20 through 23. Preemergence herbicides should have been applied one month earlier. Apply fungicides after irrigation. Rodent bait should be applied just before covering.
18. Fill the structure to a depth of 6" or 7" with clean, moist propagating medium. Be certain that medium is level. An alternative to filling the frame is use of cellular trays filled with media.
19. Insert cuttings and water in thoroughly; then follow steps 20 through 23.
20. Use flexible wire or heavy cord to tie the bows together so that they cannot flex to either side. Another alternative is to use a single 20' PVC pipe centered at the top and attached to each bow to add greater rigidity to the frame.
21. Center the 12' x 30' sheet of white copolymer film over the hoop frame.
22. The cover can be secured by covering the 1' of surplus film along one of the long sides with soil, gravel or batten tape. To allow easy access to the plants or cuttings, the other three sides of the film can be held down with boards, rocks, pieces of wood or gallon jugs filled three-fourths full. Winter protection structures should have kickboards braced with soil or gravel during snow season to provide extra support.
23. On warm days the structure may require venting. This can be done by opening the ends and then closing them down again later in the day.

If properly constructed, the framework of your quonset should last for years. With a minimum amount of care, the white copolymer cover



**Figure 3.** This overwintering structure was built based on the principles outlined here but using less material. For example, the PVC pipe bows are attached directly to the kickboard by screws rather than by electrical conduit hangers. The endwalls are made of wood to allow more rigidity. Additionally, a portion of the floor was excavated to lower plants below ground level. This takes advantage of the earth's natural insulating properties but can cause flooding if drainage underneath is poor.



**Figure 4.** This overwintering structure has a dual purpose: It is overwintering plants in various container sizes, and it is being used as a propagation structure. The grower has set dormant (hardwood) stem cuttings in containers filled with propagation medium. By watering them at least once a week, he can root the cuttings by spring. He wrote the names of the plants on tags in each pot. Correct nomenclature and plants being true to name are very important to keep organized in production. To increase the burden the structure can bear, a 2" x 4" "purlin," or center line, has been added to hold the PVC bows straight and the endwalls upright. This was done by using wood endwalls as noted in Figure 1. Use of a purlin will not work if the endwalls are kept open. In that case, use cord or wire instead to attach the bows together as mentioned above.

should last for two or more years if it is UV stabilized. Precautions should be taken to ensure that nails and wire used in construction of the framework are properly bent and do not tear the cover. Also, if the structure is not going to be used for prolonged periods, it is best to

remove the white copolymer cover, carefully roll it up and store it out of direct sunlight. Do not fold the cover, as the creases will cause weak areas that will tear easily when the cover is replaced on the quonset. Storing the cover when it is not in use will extend its life.

Please see “Preparing Nursery Crops for Winter in the Southeast” (North Carolina Cooperative Extension Service publication AG-454, available at [nurserycropscience.info](http://nurserycropscience.info)) for more information about overwintering methods and extra tips to improve success.

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