University of Wyoming Extension

Wyoming Specialty Crop Program

Wyoming Department of Agriculture

12 Ft. x 12 Ft. Hoop House Construction

Hoop House
12 Ft. x 12 Ft.

Hoop House

A hoop house, poly-tunnel, cold frame green house and high tunnel can be basically the same structure with minor changes to the design. The hoop house gets its name from its shape, although houses can be constructed with straight lines using elbows to get the desired shape for a building. The shape of a hoop house causes water and snow to be shed from its exterior while permitting sunrays to provide heat. Houses of this category are made with aluminum pipes or plastic PVC pipes as hoops that are covered with a single layer of polymer plastic covering. A second layer may be added for better insulation.

Reasons To Build Hoop House

Hoop houses are ecosystems all in themselves, and the environment inside can be manipulated to the crop's needs. Hoop houses can extend the growing season, since you may can plant early, the collection of heat units within the plant is higher resulting in earlier harvesting. Planting in late summer and early fall allows you to produce and harvest into the winter months. Planting in a protected environment guards the crop from mother nature's whims and control the crop's quality.

Factors To Consider Before Building A Hoop House

Hoop houses are relatively easy to construct, costing between $2to $6 per square foot depending on size, for materials, with low maintenance once constructed. They are easy to build and adapt to small land units to meet the needs of gardeners and farmers. Since plants need sunlight to grow, light penetration should be a concern in structure design. Grow lights can be used but require an electrical source. In an area where wind and snow are part of nature, consider load limitations the structure must have to endure stress. The height of the hoop house can be adjusted so that one can walk and work inside comfortably, therefore, one must think about height before construction starts.

Selecting A Site For A Hoop House

Select a site that is moderately level with good drainage and good soil for planting. A site can be modified by soil fill so that construction is on a pad. Select a site in an open area where trees and other obstacles will not affect sun penetration. Consider the surrounding area so the structure will be protected against high winds and heavy snows, thus providing longer life. Water and electricity may be needed for the hoop house, so a source nearby should be considered. Security and protection against vandalism of the Hoop House and crop may also be a factor to consider when selecting a site.

Orientation Of The Hoop House

For Wyoming the preferable, positioning for a hoop house is an east↔west direction. Air currents come from a northwest direction and will help ventilate the hot air buildup within the hoop house on hot days if roll up sides are not installed. The east↔west orientation allows for plenty of sun penetration in the spring, summer and fall, since the sun tracks from east to west. The lay of the land, windbreaks or other considerations may take precedence in the hoop house orientation.

Laying Out The Hoop House

Begin by choosing the size of a hoop house that meets your needs. Then square off the corners of the hoop house using the Pythagorean Theorem.

$$A^2 + B^2 = C^2$$

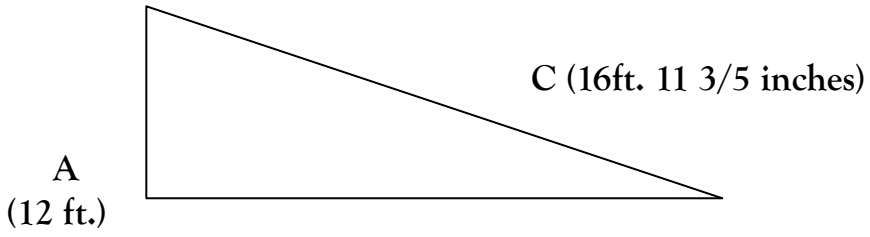
(Length of Building) ^{2} + (Width of Building) ^{2} = (Hypotenuse of Building) ^{2}

Example: A (12 ft.) ^{2} + B (12ft.) ^{2} = C^2

144 ft.^{2} + 144ft.^{2} = 288ft.^{2}

$\sqrt{288}$ = 16ft. 11 3/5 inches

C = 16ft. 11 3/5 inches



B (12ft.)

Squaring the building is critical so that the rest of the structure proceeds normally in construction.

Setting Stakes

After squaring the corners of Hoop House, mark by setting four stakes in the ground at each corner using ½ in. rebar 24 in. long. Drive these stakes 12 ins. into the ground at a 30 degree angle from vertical pointing inward. Half the stake will now be underground and half the stake above the soil. Place a string around the four corners to outline the Hoop House foundation.

Along both lengths of the Hoop House and inside the string, drive 24 in. rebar stakes every 3 ft. apart, 12 in. deep, at 30 degree angles, until you reach the desired length.

Making The Plastic Pipe Ribs

We recommend the use of 2 in. PVC in making the ribs, because it holds up well to the stress of wind and snow that come in the fall and winter. Use new plastic pipe for construction because weathered pipe will be brittle and break. The standard length for PVC pipe is 20 ft. length. Set the ribs over the rebar stakes. This is accomplished by placing one end of the PVC pipe over one of the stakes, next place the opposite end of the pipe on the lateral stake on the opposite side.

Placing the Wood Baseboards

Baseboards are installed to give the Hoop House stability, and are where the plastic covering is attached. Place the outer baseboards along the outside base of the hoops, using 2 in. deck screws fastened to the 2 in. PVC pipes. The inner baseboards should be placed along the inside base of the hoops using 4 in. deck screws.

The outer baseboards should each be one 1 in. x 4 in. x 12 ft. and two 1 in. x 4 in. x 10 ft. boards, butted and fasted together by short (14 in.) brace pieces with the 12 ft. board in the middle. The inner baseboards should each be one 2 in. x 4 in. x 12 ft. and two 1 in. x 4 in. x 10 ft. Make sure the screws and brace pieces are facing toward the hoops when installing the baseboards.

When both sides are in place, drive two 24 in. rebar stakes bent in a "J" design, between the two baseboards 0 ft. from each end along each side. These are hooked over the inner baseboard. This will help keep the Hoop House anchored during high velocity windstorms.

Installing Purlins

There are 3 purlin braces running the length of the of the Hoop House that will be used for stability and also for attaching plastic. The purlins will be made from one 1 in. x 4 in. x 12 ft. and two 1 in. x 4 in. x 10 in. boards, butted and fasted together in the same fashion as the baseboards.

Mark the purlins every 36 in. where they will be attached to each 2 in. ribs. Two purlins will be attached 60 in. above the end of each pipe and one down the top middle of the hoop house. Marking the two end hoops and running s string can easily achieve a straight line.

Attach the two side purlins to the outside of the hoops using 2 in. deck screws. The brace pieces must be facing inward. The third purlin should be attached on the inside, down the top middle of the hoop house with the brace pieces facing down. Make sure that the purlins are flush with the outside of the first end hoop, the markings should coincide with the center of each hoop.

Attaching Polyethylene Plastic Covering

The green house plastic acts as the skin to the structure, letting light rays in and keeping the weather out. There are different grades of poly covering, but a 6-ml. weight works well for hoop houses. It is recommended to use polyethylene coverings that have been treated with a UV inhibitor, and guaranteed to last at least three years. Unprotected polyethylene plastics will break down over a growing season.

The plastic will be attached using approximately 100 ft. of furring strips. These strips are made by ripping 2 in. x 4 in. x 10 ft. boards into 2 in. x 3/8 in. x 10 ft. sections. Pull the greenhouse plastic over the structure so that it is evenly distributed on the sides and ends of the Hoop House.

Keeping the plastic stretched, attach one side by sandwiching the plastic poly covering between a furring strip onto the baseboard, using a 1 in. deck screws, every 12 in.

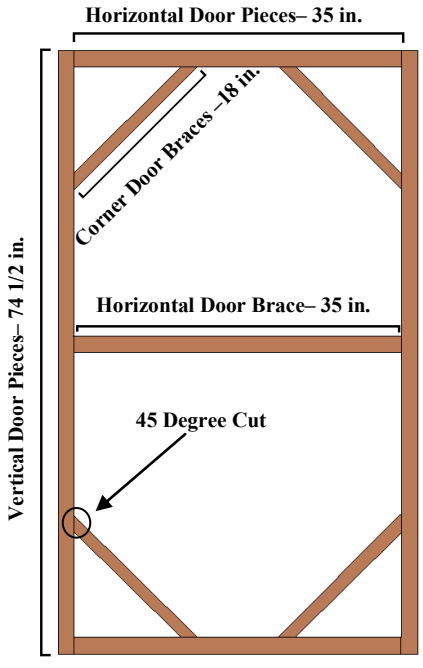
When one side is complete, attach the opposite side in the same manner. When complete, fold the extra plastic into a 1 foot width and shovel dirt onto the extra plastic at the base of the Hoop House. On the ends, stretch the plastic tight and sandwich the furring strips and the 2 in. plastic hoop using 1 in. deck screws ever 1 ft. Pre-drill the furring strips every 12 in apart so the wood does not split.

Adding End Walls

End walls are used for access into the hoop house, protection against the elements of nature and also to permit air circulation and remove heat. Stretch a string at the bottom of the first hoop, and find the center, which will be used as a guide to construct the entrance. From the center point, measure along the string 2 ft. in each direction. Mark these spots and dig a hole 6 in. round and 18 ft. deep. Place a 10ft. 4 in. x 4 inch into each hole, and cutting the board at an angle the tips so that the wood fits snugly under the hoop. Level the 4 in. x 4 in. both directions, making sure there are 36 in. from the inside of the wood. Fill the holes with dirt, and secure the top with a 4 in. deck screw running through the pipe into the wood.

Braces should be made to fit on either side of the door between the door frame and the 2 in. PVC pipe at the same level as the side purlins and bottom base boards. In order to ensure a secure fit, the boards should be cut to the angle of the pipe and attached using 4 in. deck screws. A level can be used to ensure straightness.

Cut to length and attach a 2 in. x 4in. in between the uprights at 76 in. The door is constructed from 2 in. x 4 in. boards. Cut two 74 1/2 in. vertical pieces and three 41 in. horizontal pieces. Attach pieces and square using a carpenters square. Four diagonal 18 in. corner braces cut at 45 degree angles are used to keep the door squared. (Door measurements may need to be adjusted to accommodate any discrepancies in the uprights.) Fasten the door to the uprights using two hinges as well as a latch for securing the door. Secure the plastic to the doorframe, door and end wall using furring strips. Batten tape should be stretched over the top of the Hoop House between each rib and secured to the baseboards on each side.



Conclusion

These structures, with special plastic covers, can keep inside temperatures 4 degrees to 6 degrees Fahrenheit warmer than outside temperatures, and with a row cover made from specially improved webbings over the crop, an additional 4 degrees to 6 degrees Fahrenheit increase can be obtained. In Wyoming with these structures one can make growing of vegetables and herbs affordable and profitable for most of the year.

12 ft. x 12 ft. Hoop House Construction
Material List and Estimated Cost

Item		Cost Per Unit	Quantity	Total Cost
1.	Plastic PVC Pipes 2 in. x 20 ft.	22.50	5	$ 112.50
2.	Rebar ½ in. x 24 ins.	3.00	8	24.00
3.	Screws (Decking Screws)			
	1 in. Box 150 Screws (1 lb.)	10.00	1	10.00
	2 in. Box 150 Screws (1 lb.)	10.00	1	10.00
	4 in. Box 150 Screws	10.00	1	10.00
5.	1 x 4 Boards			
	1 in. x 4 in. x 10ft.	7.00	3	21.00
6.	2 x 4s			
	2 in. x 4in. x 10ft.	5.00	4	20.00
	2 in. x 4in. x 8 ft.	5.00	6	30.00
	2 in. x 4 in x 8 ft wood	3.50	12	42.00
7.	Plastic Cover (6 mil) 22 ft. x 30ft.	150 (price minus shipping cost; shipping cost dependent on destination)	1	165.00
8.	Batten Tape	10.00	1	10.00
9.	Hinges	4.00	6	24.00
10.	Latch	6.00	2	12.00
Sub Total				$ 480.50

Costs will vary depending on location of purchases. This estimate was based on local hardware prices and a fiber reinforced plastic covering.

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