DIY High Tunnel Plans

BOOTSTRAP FARMER

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PLEASE CHECK ALL LOCAL BUILDING CODES BEFORE PURCHASING AND BUILDING ANY STRUCTURE OF MAKING ANY IMPROVEMENTS

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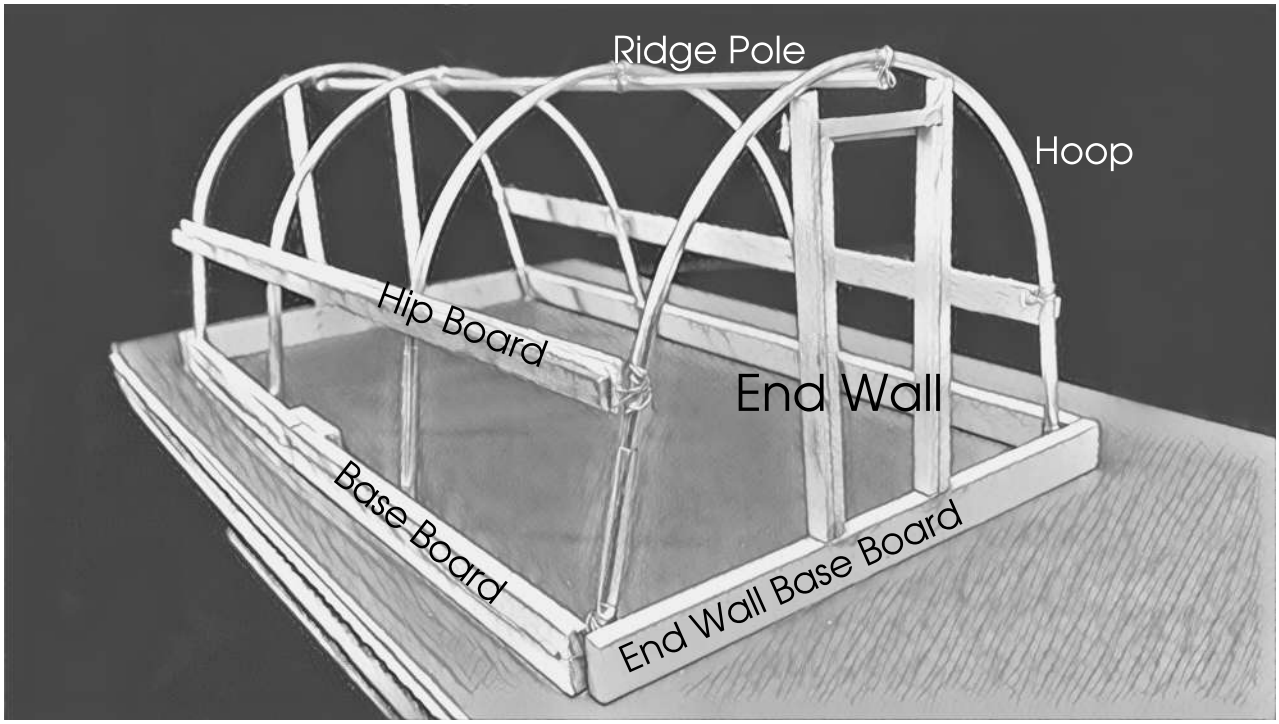
Identifying Structure Components



Tools Needed

Hacksaw
Reciprocating Saw
Socket Wrench
Adjustable Wrench
Nut Drivers
Electric Drill with Extra Drill Bits
Sledge Hammer
Mason Line
Line Level
100' foot tape measure (if building 100' long get a 200' tape measure)

Included Hardware List

¾" Self Tap: U Channel and Connect Hoops

¼" Washers: Flat / Lock / Nut

¼" x 2" Hex Bolt: Ground Posts to Hoops

¼" x 4" Carriage Bolt: Hip and Base Boards to Hoops

2½" Phillips Flat Head Wood Screw: End Walls

1¼ " Phillips Flat Head Wood Screw: Lock Channel to Hip and Base Boards

What is included in Kit:

- 6 mil Plastic (SINGLE LAYER)
- All Spring Wire and Lock Channel Including enough for End Wall: Attaches Plastic to Structure
- Cross Connectors: Attach Ridge Pole to Hoops
- Ground Post Driver: To Install Ground Posts
- All Nuts, Bolts, Washers, and Screws

Parts to Source Locally (# pieces):

6' Wide Greenhouse					
Description	**20' L**	**40' L**	**60' L**	**80' L**	**100' L**
10' x 3/4" EMT for bows, ridge & roll-up sides	8	16	24	32	40
10' x 1" EMT Conduit for Ground Post	3	6	8	11	13
1" x 2" x 8' Furring Strip for Hip board	12	24	32	44	52
10' - 12' Wide Greenhouse					
Description	**20' L**	**40' L**	**60' L**	**80' L**	**100' L**
10 ft 1-3/8" top rail for bows & ridgepole	14	26	38	50	62
8 ft 1-5/8 in. line post for ground posts	6	11	16	21	26
1" x 8" x 8' ledger board for base board	6	12	18	22	28
2" x 4" x 8' stud for door	16	16	16	16	16
26" x 8' clear roofing panel for door	2	2	2	2	2
1" x 4" x 8" board for door	2	2	2	2	2
2" x 6" x 12' board for end-walls	2	2	2	2	2
20' Wide Greenhouse					
Description	**20' L**	**40' L**	**60' L**	**80' L**	**100' L**
10 ft 1-3/8" top rail for bows & ridgepole	20	37	54	71	88
8 ft 1-5/8 in. line post for ground posts	6	11	16	21	26
1" x 8" x 8' ledger board for base board	6	12	18	22	28
2" x 4" x 8' stud for door	16	16	16	16	16
26" x 8' clear roofing panel for door	2	2	2	2	2
1" x 4" x 8" board for door	2	2	2	2	2
2" x 6" x 12' board for end-walls	2	2	2	2	2
10' of 3/4 in. EMT for roll-up sides	6	10	14	18	22

Optional Accessories: NOT INCLUDED

Hoop Bender

Our hoop benders allow you to bend your own hoops to create a 6' wide low tunnel or a 10', 12' or 20' wide high tunnel hoop house out of 1⅜" chain link fence top rail.

Each hoop bender includes the bender, hardware for attachment to any sold flat surface and an extension bar for added leverage at the end of your bend.

- 6' wide greenhouse - (1) 10' x ½" EMT per hoop
- 10'-12' wide high tunnel hoop house - (2) 10' x 1⅜" top rail per hoop
- 20' wide high tunnel hoop house - (3) 10' x 1⅜" top rail per hoop

HOOP BENDERS ARE SOLD SEPARATELY BECAUSE MANY PEOPLE BUILD MULTIPLE HOOP HOUSES AND YOU ONLY NEED ONE BENDER PER SIZE. THE 6' 10' 12' & 20' BENDERS WILL ONLY WORK FOR THEIR CORRESPONDING WIDTHS.

Hoophouse Width (ft)	Approximate Height (ft)
6	4
10	8.5
12	8
20	10.75

Pre-Cut & Drilled Ground Posts

Our ground posts save you time & make assembling your high tunnel even easier! Ground posts come pre-cut and pre-drilled for quick installation.

Each kit assumes 4 feet spacing. Made from 1⅝" fence line posts pre-cut at 48" length pre-drilled for easy hoop attachment 16-gauge (approx. 1.29mm thick).

Two holes pre-drilled for quick attachment of your baseboard and hoops. Top hole is ¼" and drilled 2" from the top of the ground post. Bottom hole is ¼" and is drilled 23" from the top perpendicular to the first hole.

Sold in bundles to match kit sizes:

20'- 12 posts 60'- 32 posts 100'- 52 posts
40'- 22 posts 80'- 42 posts

Hoop House Roll Up Side Curtain Kit

Quickly roll up your hoop house side walls to vent or close to retain heat.

Kit includes:

- 2 hand cranks

(only 1 crank is needed per 100', so there is 2 for each side of the hoop house)

- ¾ EMT Couplings to connect locally sourced ¾ x 10' EMT Conduit
- Snap Clamps: to attach greenhouse plastic to EMT
- Lock Channel and Spring Wire for hip board to begin roll up side

*SNAP CLAMPS ONLY FIY 3/4 EMT- DO NOT USE PVC PIPES! EMT PROVIDES EXTRA WEIGHT AND RIDGED STRENGTH NEEDED FOR THE HAND CRANK!

Shade Cloth & Ground Cover

Block weeds inside of your Hoop House with Heavy Duty Landscape Fabric.

Shade cloth is available in 30%, 40%, 50%, 60%, & 70% light reduction for different crops.

AIR INFLATION KIT

Create an insulating space of air between two layers of greenhouse plastic using air from the outside, which is less humid, reducing condensation.

This kit is designed to mount to the inside of the structure. The included inlet hose can be cut to length during installation.

Operates at 110 volt, pulling 0.42 amps. Includes 60 CFM blower, exhaust air deflector and mounting bracket, 72" inlet air hose, inlet damper/air regulator

Double Layer Hoop House Plastic

For double layer hoop houses and inflation kit. This guide is the same for a single layer.

GH Width	GH Length	Plastic Width to Buy	Plastic Length to Buy
6	20	16	30
6	40	16	50
6	60	16	70
6	80	16	90
6	100	16	110
10	20	24	40
10	40	24	60
10	60	24	80
10	80	24	100
10	100	24	120
12	20	28	40
12	40	28	60
12	60	28	80
12	80	28	100
12	100	28	120
20	20	42	50
20	40	42	70
20	60	42	90
20	80	42	110
20	100	42	130

Hoophouse Width (ft) | Approximate Height (ft)

6 | 4

10 | 8.5

12 | 8

20 | 10.75

FAQ

Hoophouse Width (ft) | Approximate Height (ft)

6 | 4

10 | 8.5

12 | 8

20 | 10.75

Ground posts and bows every 4 feet.

We sink the ground posts 2 feet into the ground, allowing for higher tunnels and stronger frames.

*If you are building your hoop house taller with longer ground posts please note that decision is made by you and out of spec for this kit.

Set Location of Hoop House:

Start by placing your first marking stake at least 8 feet away from an existing greenhouse or other small structure.

For larger structures such as a home you will want to place your greenhouse significantly further away.

Most farms orient their hoop houses North to South.

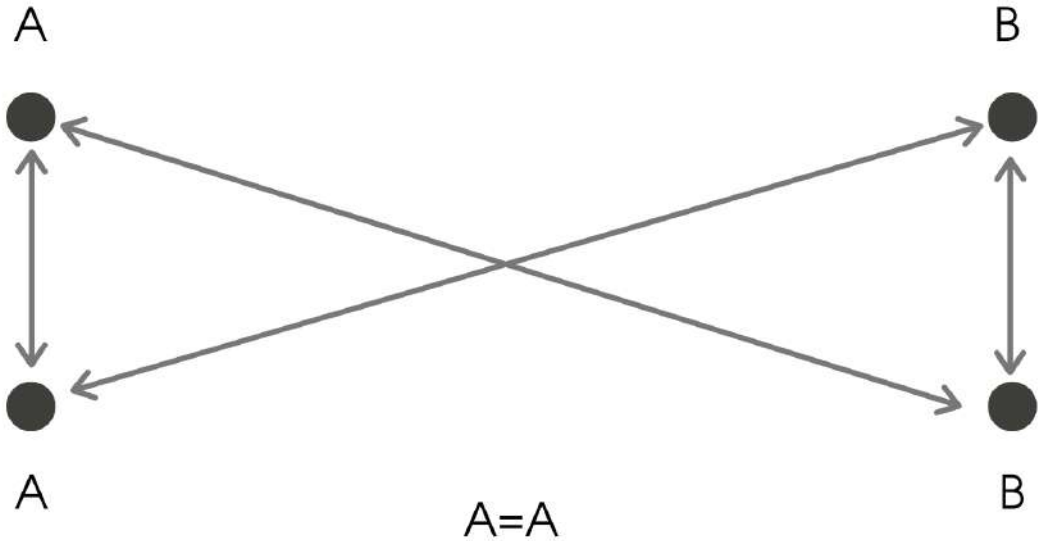
Getting Started: The Build

Weed Barrier

Lay down weed barrier if you prefer. (This is optional depending on your needs.) Secure the weed barrier with garden staples, rocks or dirt that will make up the floor of your high tunnel.

Squaring your Hoop House

Mark each corner of your planned greenhouse area with any kind of marking stake - First measure length to length (its best to stick with lengths divisible by 4'). The width should be 10, 12, 20 or 24 foot for our high tunnels. Then measure diagonally, making sure the diagonal measurements are equal to each other. Double check that each length, width and diagonal measurements are equal. This ensures your greenhouse will be square.



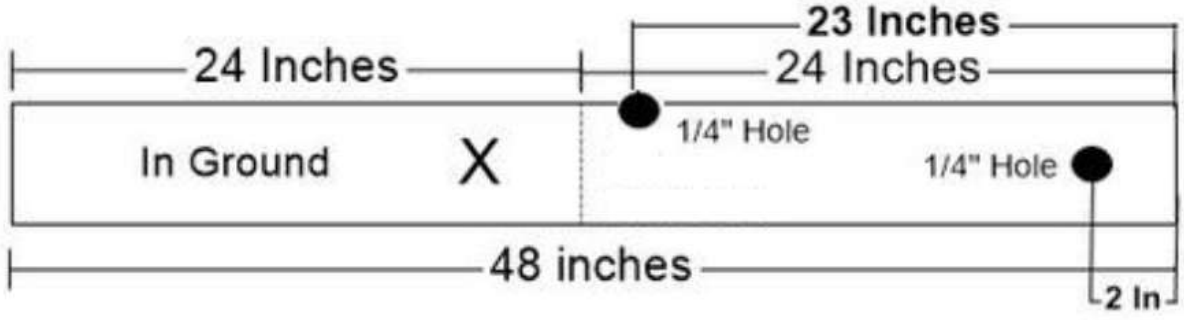
Once your area is measured out, place a temporary stake to mark the location of each corner as this will be where your first ground posts are located.

Pre-Cutting Hoop House Ground Posts (If not using our ground posts)

To make the job much quicker cut all your ground posts ahead of time. These high-tunnels require 1⅝" fence line posts found at the big box hardware stores. These are sometimes labeled as terminal posts in the stores.

To calculate the number of posts you will need take the length of your greenhouse in feet and divide it by 4 and then add 1. This gives you the number of hoops you will have. Example Length = 100 feet. (100 ft / 4) + 1 = 26 hoops. 26 hoops = 26 pieces of fence line posts. Cut each into (2) 48" pieces for 10'-24' greenhouses.

We recommend using a reciprocating saw with a vice to hold the poles in place while cutting, and you should be finished in about an hour. A hacksaw will work too but it is much slower. After all the ground posts are cut we want to mark both the depths to drive the post into the ground and the hole for EMT hoop attachment.



** Holes should face 90° away from each other **

10-20 ft Wide Hoop House: Mark the pole down the middle at 24". Put an X on one end which will be the end in the ground. On the above ground end you will be drilling two holes.

Make sure these holes are perpendicular from each other (90 degrees away from the other hole). Drill the top hole 2" from the top with a 1/4" bit. Spin the pole 1/4 of the way around.

Drill the 2nd hole 23" from the top with the same drill bit.

Installing Ground Posts

You will first install each corner ground post. Place your posts where you had previously marked the corners and begin driving those into the ground. When driving your ground posts make sure you use a Ground Post Driver. This will prevent your pole from becoming warped.While driving the posts into the ground you want to make sure the poles are level in all directions.

As you are driving the pole into the ground check for levelness on the front and sides and adjust as needed. Also pay attention to those holes you drilled. The top hole needs to be facing in the direction of your ground posts.

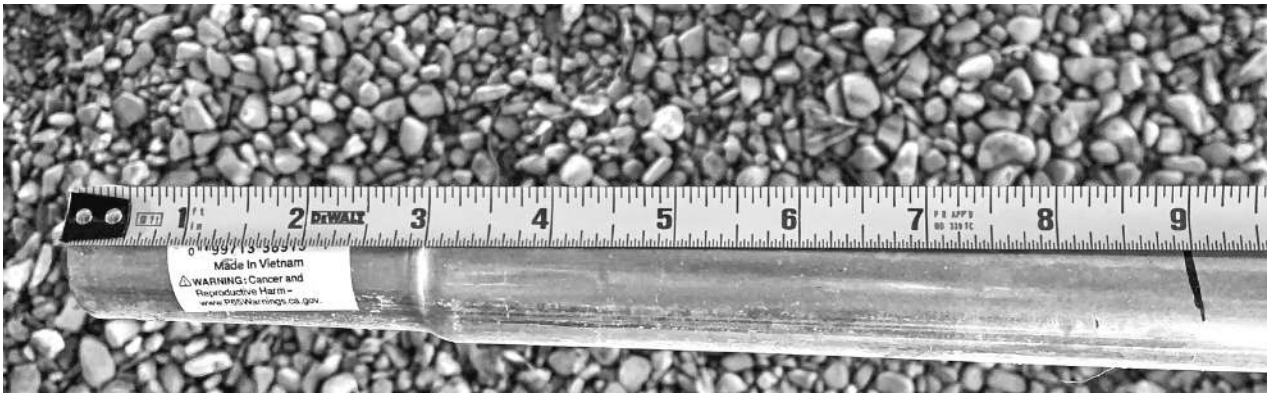
The bottom hole should be facing toward the inner part of the greenhouse. Once corner ground posts are installed re-measure length, width and diagonally one last time. If you made a mistake it's not too late to fix it without too much work. Once you are satisfied, tie a string line around the outside of the corner posts. This will help to keep all your ground posts in alignment so you don't get wavy hoops later on.

REMEMBER- POSTS ARE SET EVERY 4 FOOT

Bending Poles to Make Hoops

Bending Poles to Make Hoops

Lay out the poles with them all facing with the 'swagged' (male) end in the same direction. Mark each pole at 9" on both ends.



This mark will tell us where we insert the pole into the hoop bender and how far to insert our poles into the ground posts. Securely attach the hoop bender to a table or bench. Your hoop bender should come with screws or bolts to anchor it in place. Slip each pole through the holding strap on the hoop bender and push the pole up to the mark you made. Bend the pole every 18".

We laid out some scrap pieces of wood on our bench so that the pole stays level while bending. You want to try to keep the pole from twisting while you bend.

When you reach the end of the pole, use the pole extension included with your hoop bender for additional leverage.

Connecting Poles to Form Hoops

Note the following:
6 ft wide greenhouse requires (1) 10 ft ¾" EMT per hoop (1 piece)10-12 ft wide hoop house requires (2) 10 ft 1⅜" top rail per hoop. 20 ft wide requires (3) 10 ft 1⅜" top rail per hoop.

After bending the poles, join male and female ends and screw together with ¾" self-tapping screws. (Be sure not to place the screws on the top of the hoop where it would rub against the plastic.)

Start inserting all your hoops you built into the ground posts. Use the line you previously marked at 9" to know how far to push your bows in. You should expect your hoops to be a little wider than your ground posts. This is perfectly normal as you will just bend them in a little as you get each end of the hoop into the ground posts.

After setting all of the hoops into place, you may have to adjust some of these in or out to make all of the hoops look even when viewing it from the ends.

Once satisfied use your ¼" bit to drill through the hoops (at your pre-drilled hole) in the ground posts. Attach with a 2" hex bolt with washer and nut.

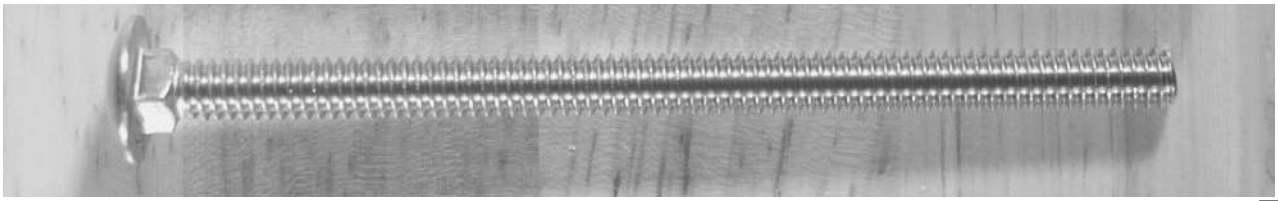
Attach Baseboards for 10-20 Ft Hoop House (Optional for 6ft)

For baseboards we use 1" x 8" x 8' white-wood ledger boards. This will be in contact with the grounds so some people like to use pressure treated wood here.

You could, however, but we don't because of the harsh chemicals that are used to treat the wood. Pressure treated wood contains chromium, copper, and arsenic. Government studies have shown that these chemicals can leach from the wood into your soil. We don't want this anywhere near our food. You might consider cedar boards which are naturally water resistant.

For the first baseboard we cut off the first 1 foot so that a board doesn't end on a ground post. Line up the cut board with the front of the first ground post.

Clamp the board to the post and use your 1/4" drill bit and drill through the wood by going through your previously drilled hole in the ground post. Insert a 4" x ¼" Carriage Bolt & tighten with a washer & nut on the outside as pictured.



Where two pieces of wood butt together, connect them with a scrap piece of 1" x 8" and attach with 2-½" wood screws (Phillips flat head #8). Be sure not to overdrive these screws as you don't want the screw tip poking out the other side as it could pierce your greenhouse plastic.Once you have all the side baseboards attached you can install the baseboards on the end walls with a 2" x 6" x 8' board and a carriage bolt, or you can do this later while building the end wall.

Installing Ridge Poles and Cross Connectors

Once all hoops are secured in place, begin inserting your ridge pole into the cross connectors or spring slips. For a 6 foot greenhouse you should have already installed your cross connectors before securing the hoops into the ground posts. On wider greenhouses you will be using 1-⅜" cross connectors.

Center all your cross connectors in the middle of the hoop which should be the highest point.

You will be using the same 1⅜" fence top rail poles you used for the hoops as ridge poles. Slide each pole through the cross connectors and connect each ridge pole together by inserting the male end into the female end and securing with a ¼" screw (again from the side or bottom but not the top).

Stand back away from your greenhouse and adjust left or right until the whole connected ridge pole is straight.

Before tightening the screws on the cross connectors, ensure each bow is 4 ft from each other then tighten or screw the cross-connectors. Be sure to screw from the side and not the top as you don't want your plastic to get caught on the screw.

Make sure each end of the pole is flush with the end of your greenhouse by cutting off the excess from one end with a hacksaw. You don't want any excess sticking out as it could get caught on your plastic.

Duct tape the ends of the ridge poles. This will prevent the plastic getting hung up on any sharp or protruding edges.

Installing Hip Boards

There is no hard rule as to where you should place your hip boards. You want to set hip boards as high as you want your roll up sides to go.

If you are NOT using roll-up sidewalls, you still want to install the hip board for stability. However, it gets mounted on the INSIDE with the bolt flush with the outside (so it doesn't interfere with the plastic).

For our hoop houses we typically place the bottom of the hip board about 36 inches (usually a little higher for larger greenhouses) from the top of the ground post. Mark each hoop at your desired height (I like to mark from the top of the hip boards as it's easier to see).

Similar to your baseboards you want to cut the first 1 foot off your hip board so the butt joints don't land on a hoop.Line up your boards on the marks and use a clamp to hold in place.

Drill a ¼" hole through your board and then through the hoop. Place a zinc plated 4" x ¼" carriage bolt through the wood and attaching with a washer and nut on the hoop end.

Installing Wiggle Wire and Lock Channel

The spring wire channel can now be installed on the hip boards. It is helpful to pre-drill the holes before installing (at least 4 holes per 6.5′ piece, 6 in higher wind areas and on larger sizes). Be sure that the lock channel is installed straight from one piece to another. If the spring wire lock channel is not straight it can create corners where it butts together and the plastic may snag.

Once the channel is installed on the hip board, install wiggle wire channel on the first and last arches (over the entire hoop but not over lapping the hip board), using a clamp to help you keep the channel in place while you bend it along the curve. Your lock channel should easily bend to the curvature of your hoops.

End-wall and Doors for Hoop Houses

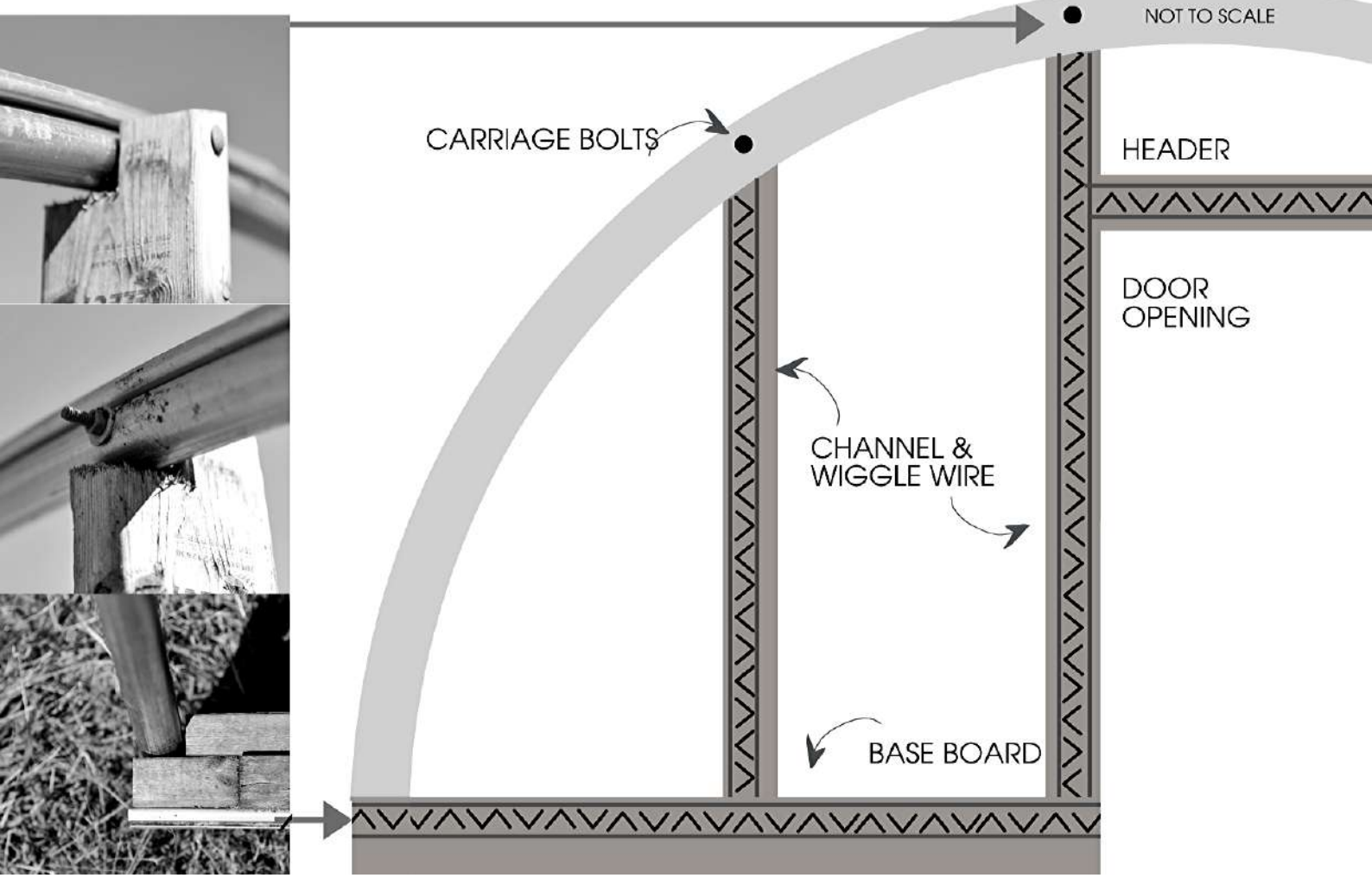
There are many ways to build end wall doors. Searching online you will find an endless number of ways to do this however we are providing what we find to be the easiest. If you haven't already done so now is the time to install the baseboards on the front and back of your greenhouse. Simply run the baseboard the entire length of your greenhouse and attach to the end ground posts with a 4"x¼" carriage bolt.

Installing the Door Frame

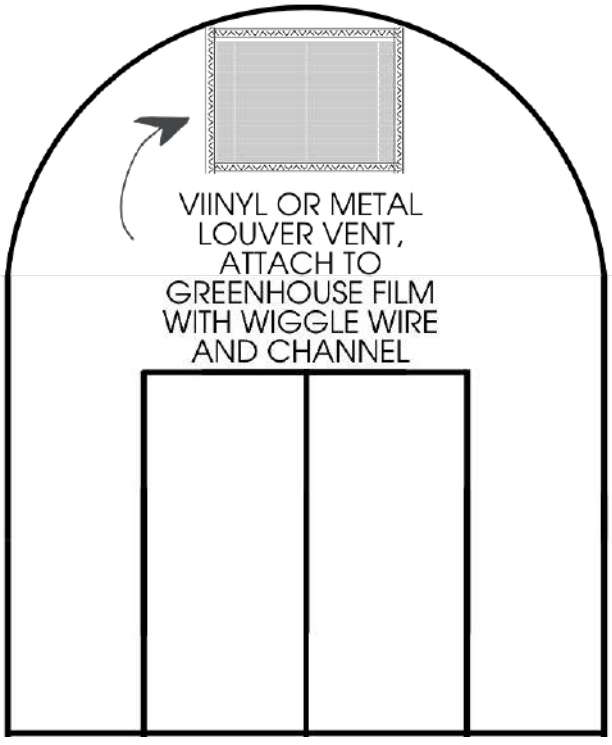
You will want to make sure that your door is wide enough to fit a wheelbarrow or tiller through.

- Take the width of the door you want to build and divide it by half.
- Measure from the center of the hoop in a straight line and put a mark on each side on the hoop. Then place a 2" x 4" from the ground up to the mark with the wide sides facing each other (skinny side facing outside).
- Trace the top and bottom of the curve from the hoop onto the 2" x 4" and then cut the top mark with a jig saw.
- For the bottom mark you will cut out a 1⅜" deep notch. This is how you will anchor the stud to your hoop. You want the 2" x 4" to be just slightly shorter than the top of the hoop.
- Repeat on the other side of the door frame.To attach you will drill a ¼" hole through the hoop and notched 2" x 4" and insert a ¼" x 4" carriage bolt into the hoop and through the wood. Secure with a washer and nut against the wood. The bottom of the stud should be behind (toward the inside of the greenhouse) the baseboard. Then use a bubble level to level the stud and secure with 2½" wood screws through the baseboard.

WOOD FRAME END WALL



Base & Stud cut out detail



Adding passive vents to the top of your hoop house is a great way to release excess heat in the summer.

Door Header is made by measuring door opening, cutting a 2x4 to that length and screwing at correct height from the side.

Adding Door Header

Determine the height you want to make your door. Add an extra 7/8" to account for the reveal around the top (⅜") and bottom of the door (½"). Measure up from the baseboard along one of the inner door frame boards to that measurement and make a mark.

Repeat for the opposite side as well.Cut a 2" x 4" to fit in-between with the bottom lined up with your marks. Make sure your header is level using a level and adjust as needed. Secure your header using 2½" wood screws by screwing to your posts. Cut another 2" x 4" to fit directly above your header to form an L as a header. This should be flush with the outside of the lower header piece. Secure this piece with the 2.5" wood screws as well.

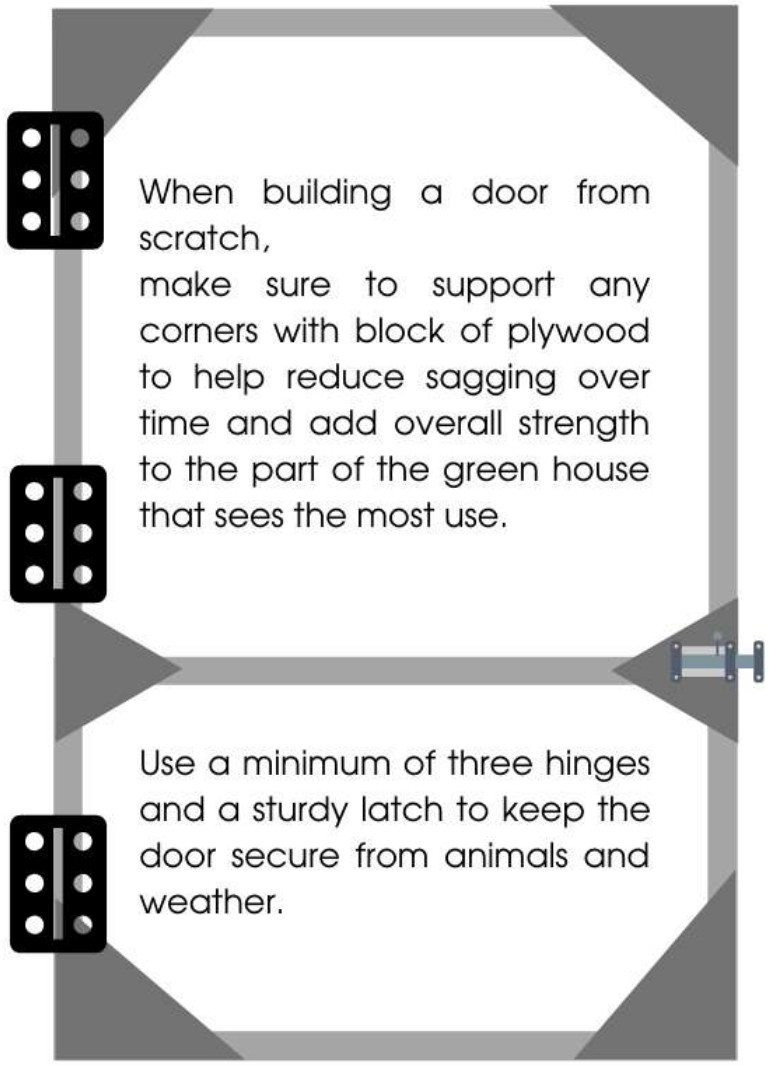
Now you want to install posts on the sides of the door frame. These provide areas to secure your wiggle wire lock channel later on. The easiest way to measure these side posts is to place the bottom on the ground and just mark underneath the hoop and cut. Secure these additional side posts with the same 2.5" wood screws.

Building Your Own Door

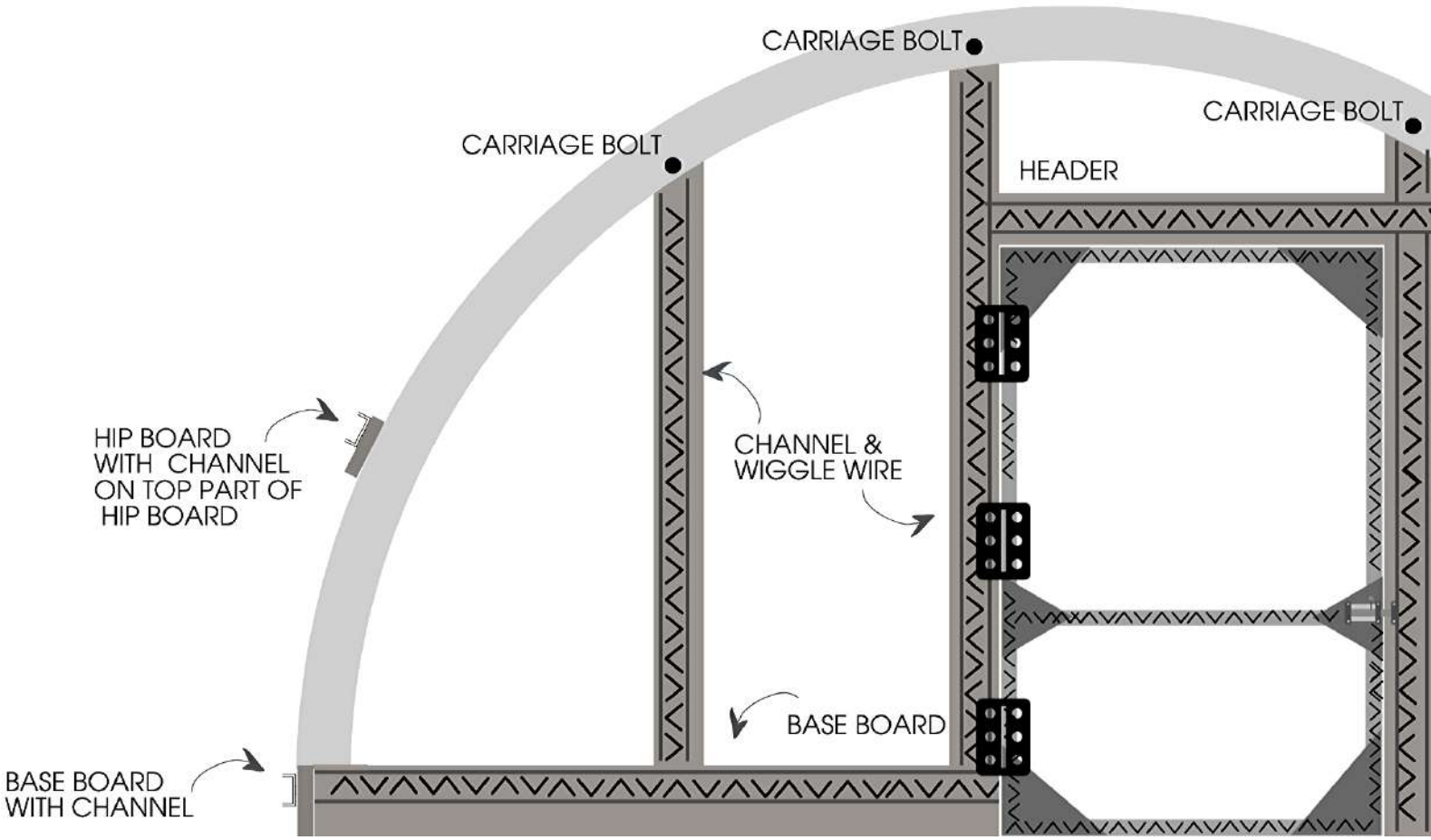
We used a screen door on our last build, which was much easier. But, to build the door frame use two 1" x 4" boards to create a door frame. The width of your door should be ¾" shorter than the opening and length 7/8" shorter. This allows for ⅜" of expansion on each side and top of your door when it gets wet.

To provide your door some support we sandwich plastic and chicken wire between the two 1" x 4" boards, or we recommend the plastic roofing panel at your local hardware store. You also want to add a 1" x 4" board in the middle of your door for stability.

Install your door with some zinc plated hinges, making sure while installing to keep the spacing between the door and frame even. After your door is installed place your lock channel around the frame of your door.



You can place Lock Channel and Wiggle wire on the door to secure plastic or cover whichever way you see fit for your application.



Remember, end wall construction needs to suite your farms needs. Consider equipment, how many times you go in and out, simplicity, security, and your building skill comfort level.

When sourcing parts like hinges and latches remember to look in the fencing section for parts designed for outdoor use.

Installing Hoop House Plastic

First, make sure you can finish securing the plastic before you end for the day so it doesn't blow away on you. Roll the plastic out and drape over the length of the greenhouse, equal distant from each end. Securing the plastic only on one end by installing the wiggle wire from the top of the arch to the hip board.

Once the plastic is secure on the first end arch move to the opposite end and secure the greenhouse plastic in the arch the same way. Pulling the plastic tight as you go. Just install the wiggle wire down to the hip board. We will install the remainder of the wiggle wire after we complete the roll up sides.

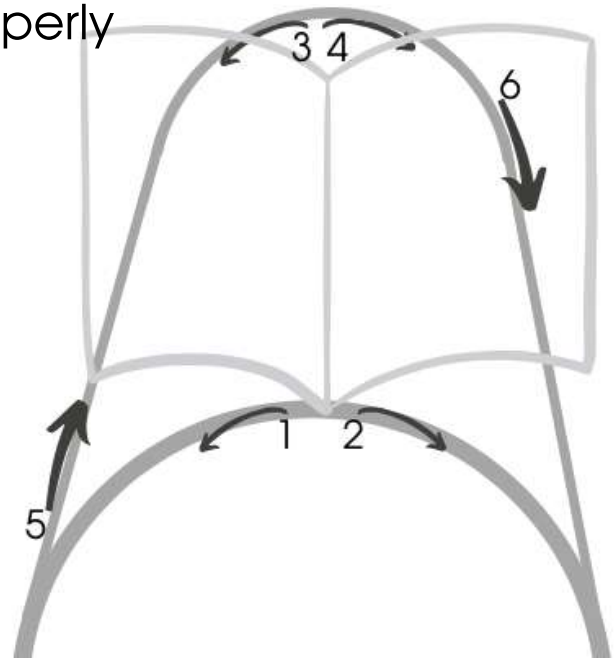
Installing plastic can be the most intimidating part of your build but once you get going you will find it to be pretty straight forward. You can start side to side or front to back. Having 2-4 people will make the job go faster. Keep a rounded broom handle or painters pole handy to help gently push plastic over hoops in the middle. You got this!

1 - Install spring wire in the middle top of hoop to bottom
2 - Spring wire top down on other side
3 - On opposite side, pull plastic tight and repeat step1
4 - On opposite side, pull plastic tight and repeat step 2

*Note: If you are not installing roll up sides move on to step 5. If you are installing roll up sides proceed to "Install Roll-up Sides for hoop house Ventilation" in the next section.

5-Pull tight and spring wire long side of hoop house
6-Pull tight and spring wire long side of hoop house on other side

*Leave enough overlap to cover end walls
**You need to be able to read the label from the INSIDE to keep anti-condensate side down and installed properly



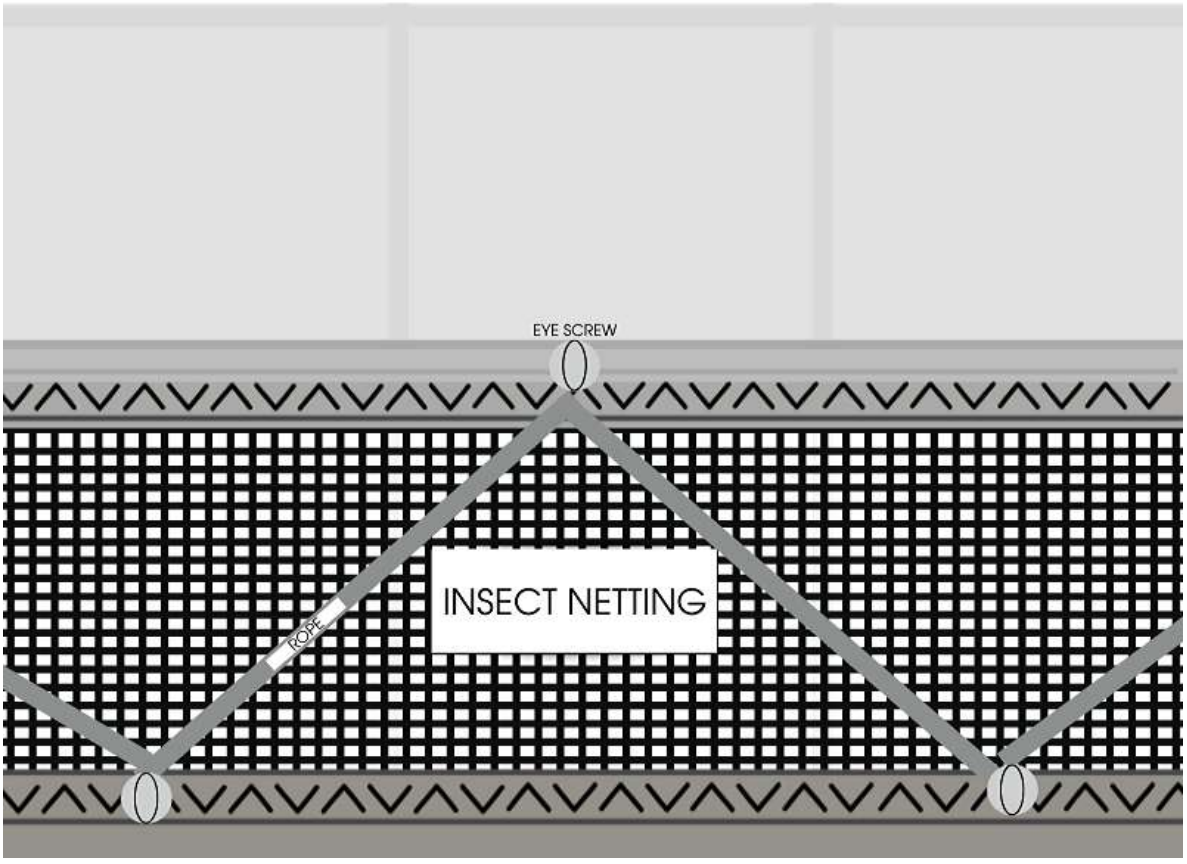
Options for side walls

Depending on your farm's needs you may elect to install incest screen, diagonal rope securing line for roll up sides, or other specialty considerations.

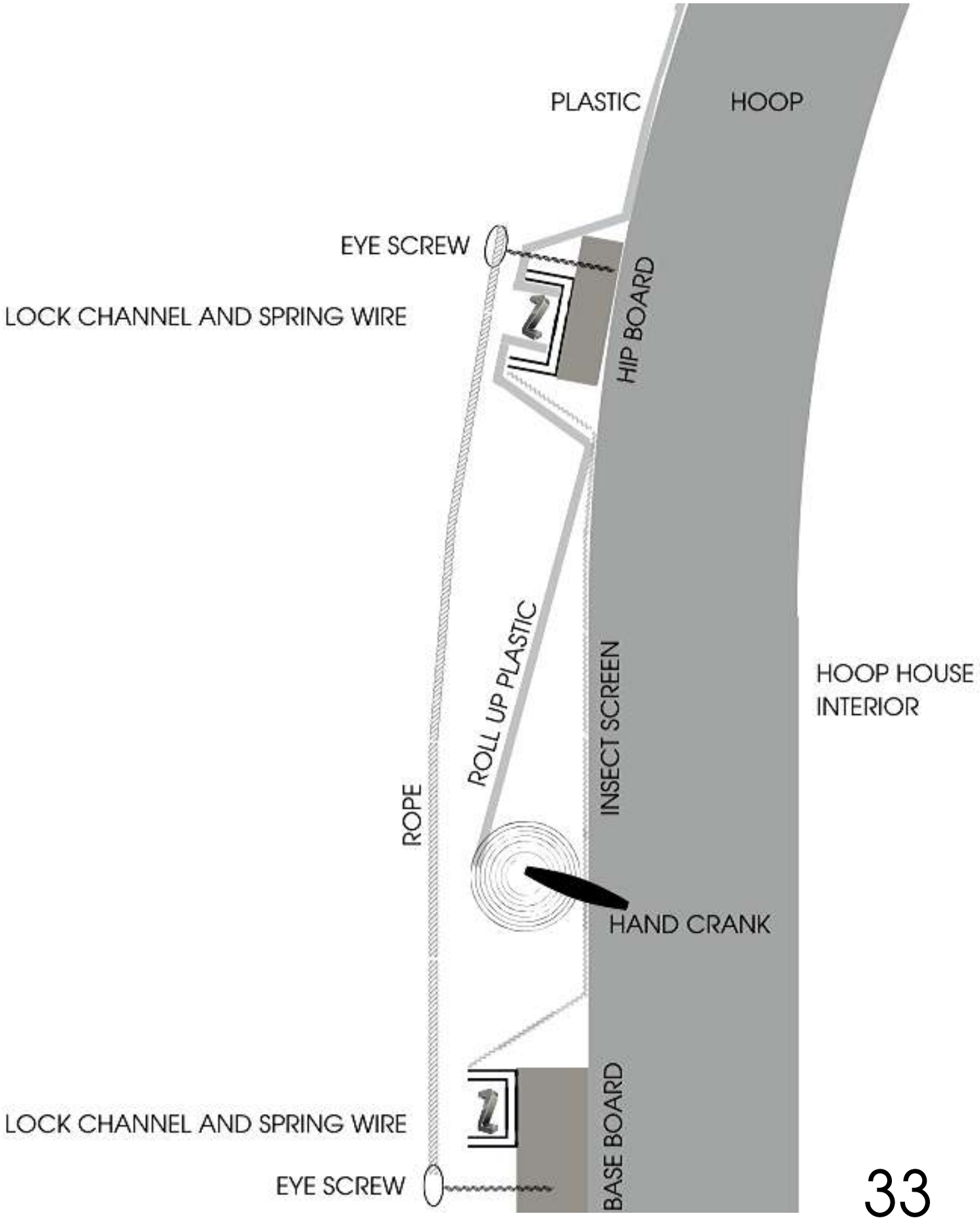
The following two graphics illustrate what we have done in the past that worked very well.

Some notes to consider when customizing your build:

Lock Channel can hold at least two layers of plastic and spring. We have also been able to fit a third layer depending on the thickness. We have also seen people use a double row of lock channel.



Side Detail

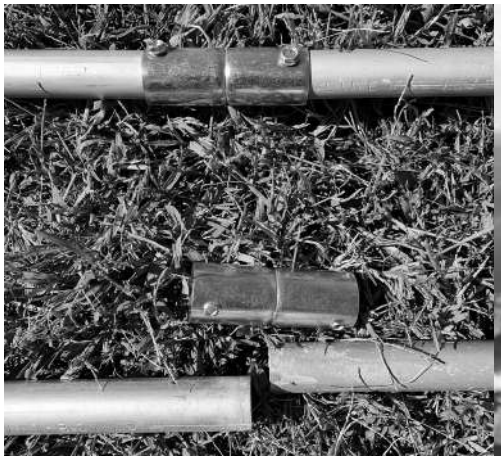

PLASTIC
HOOP
EYE SCREW
LOCK CHANNEL AND SPRING WIRE
HIP BOARD
ROLL UP PLASTIC
ROPE
INSECT SCREEN
HOOP HOUSE
INTERIOR
HAND CRANK
LOCK CHANNEL AND SPRING WIRE
BASE BOARD
EYE SCREW

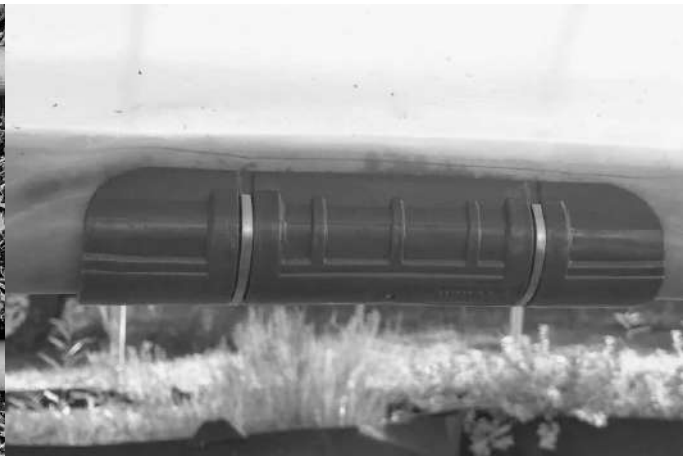
Install Roll-up Sides for Hoop House Ventilation (Optional Kit)

Now is the best time to install your roll-up sides. Doing this now will help pull down the plastic tight before the wiggle wire is installed on the hip-boards. This will ensure even venting when the hand crank is used.

Connect ¾″ EMT conduit along the length of each side of the greenhouse, using ¾" couplings to connect the pieces together. Extend the EMT a foot past the edge of the greenhouse on both sides. If you are using our ¾″ couplings, using self-taping screws to secure the poles together. If you are using a standard EMT coupling make the screws as tight as you can to prevent slippage. Roll the ends of the plastic around the connected EMT until the greenhouse plastic is tight and the pole is flush with the bottom of the greenhouse.

Install snap clamps every 2 ft to ensure even ventilation. After all the snap clamps are secure, the greenhouse plastic should be hanging down taught.



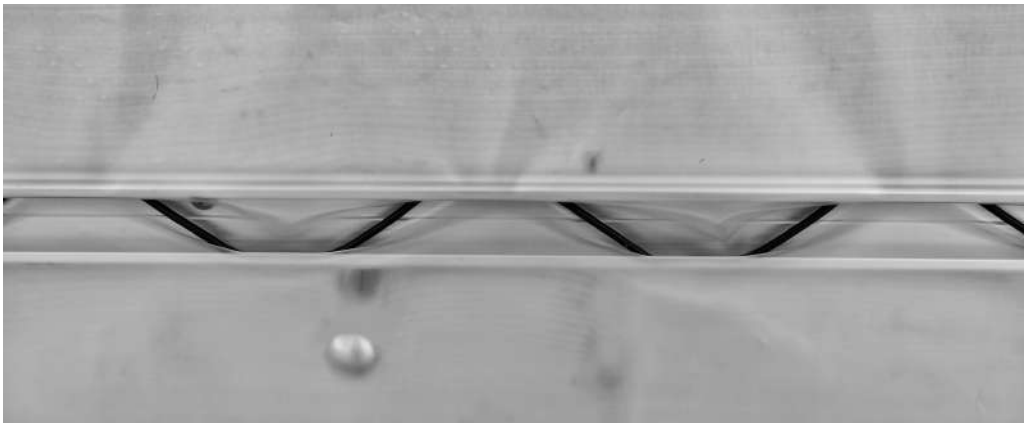


Secure Hoop House Plastic with Spring Wire

This is the time to install the rest of the wiggle wire onto the hip boards. Work your way down from one end to the other. The plastic should already be somewhat taught from the weight of the EMT conduit.

When the length of the greenhouse has all of its plastic secure, now is the time to move to the front and back of the greenhouse to secure the plastic. If you find that the plastic is not tight enough hopefully you used wiggle wire. You can simply just wiggle the wire out of the channel. Pull the plastic tight and reinstall the spring wire.

Use the wiggle wire to install the plastic on the end walls, in the same manner as before, starting from the top and working down towards the ground. The plastic will need to be cut in half to be used for each end.

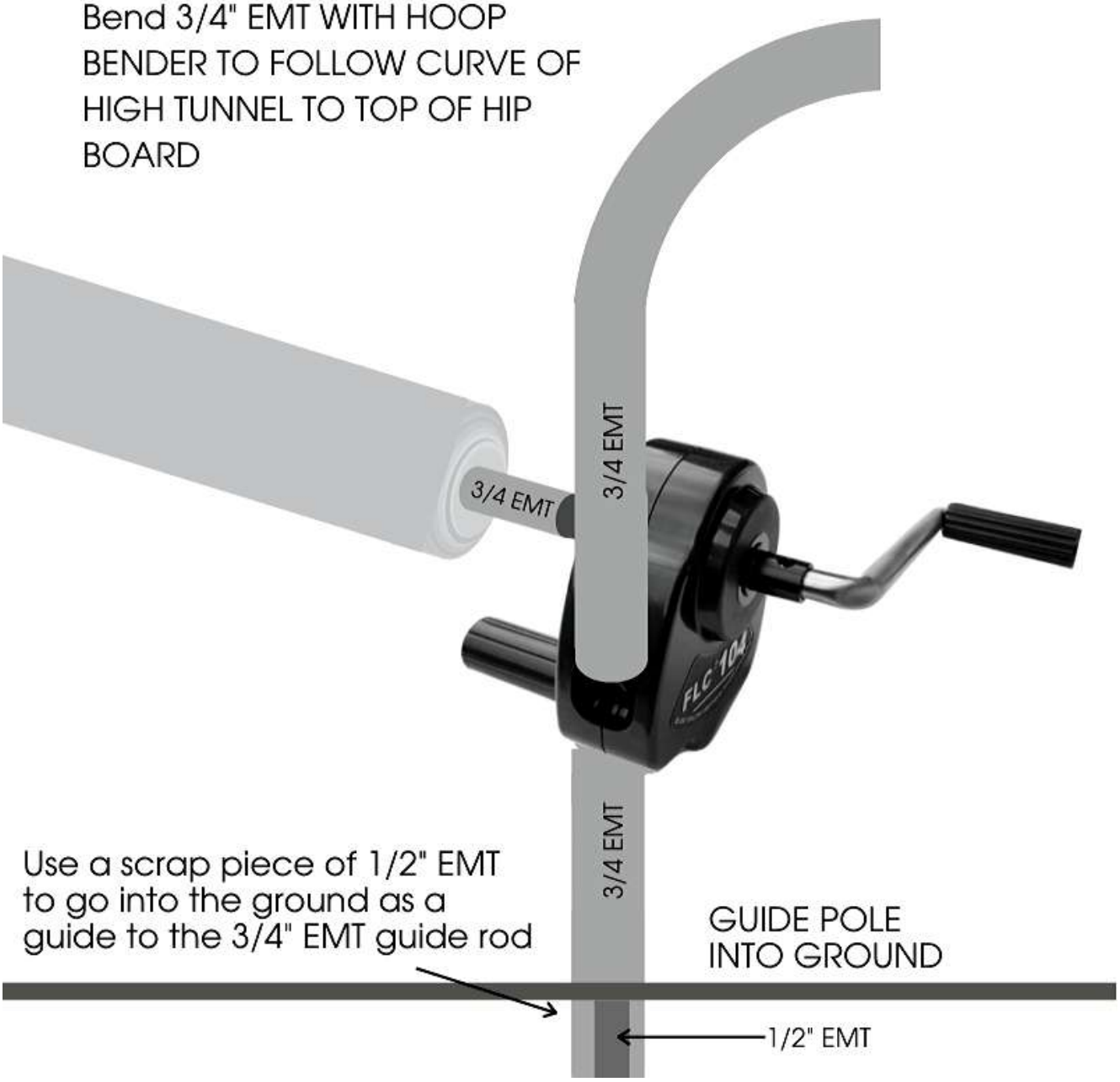


Install Hand Crank for Roll-up Sidewalls (Ventilation for your Hoop House)

The wiggle wire should be secure on the top ends and at the hip board all along the sides first. The EMT on the roll up sides should be extending a foot past the greenhouse on each end. You will just have to eye this one out a bit, but it's very simple.

There are different ways to secure the guide rail for the hand crank, but the simplest is to take a scrap piece of ½" or 1" EMT, about 3-4 ft, and hammered that into the ground near the edge of the 3/4" EMT conduit. I then put a 6 ft piece of EMT conduit about 2 ft down into this pipe and put in 2 screws at ground level to secure it.

Put your hand crank on the guide rail, slide in the ¾" conduit, drill a hole and use the included screws to secure and you're done!



Rolling the plastic in towards the hoop house rill reduce water getting into the plasrtic roll

Congratulations!

Your DIY Bootstrap Farmer Hoop House is now ready for years of service on your farm.

For additional questions email:
contact@bootstrapfarmer.com

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