

# **Do's & Don'ts of Greenhouse**

## **Construction**

- **Do refer to your sales order to determine what parts and subassemblies you purchased, then go to the instruction manual to find out how to assemble.**
- **Do read all instructions thoroughly, and read ahead to see what the following steps will be. Don't just look at the pictures to see how things are assembled and don't assume that all greenhouses are constructed in the exact same way.**
- **Do inspect all parts to make sure nothing is damaged or missing. Don't wait to call us with a problem. Take digital photographs and e-mail to your salesman.**
- **Do use common sense in locating your greenhouse site and constructing your greenhouse. Don't do anything to jeopardize the safety of you and anyone else involved in the construction process.**
- **Do follow all instructions of the equipment supplied and install properly. Don't assume if you don't know the answer of how something is installed. Call RGS if you have any questions and we will either provide the answer or put you in touch with someone who can assist you.**
- **Do follow all guidelines and laws within your town and state. Do not avoid getting the proper permits or paperwork for construction.**
- **Do not force anything during the assembly process. If there is a problem with something not fitting correctly, we may have made a mistake or you may not be following the instructions properly. Do call us if there is a problem.**
- **Do take your time so that the job is done right and there is no re-work. Don't rush and make mistakes.**
- **Do not re-engineer the greenhouse if there is a problem or unusual situation that may have occurred. Do call RGS and use common sense if a connection has to be made to a building, if you are having problems with your site, or any other unusual situation has occurred.**
- **Do not get uptight with construction. Construction may take longer than it's supposed to, and construction may cost more than it's supposed to. Do relax!!**

## Recommended Assembly Tools

The table below lists a variety of tools that could be used to assemble your greenhouse. Some are supplied by RGS, and some are supplied by you. Between the supplied tools and those you already own, you should have all the basic assembly tools. The optional tools are listed because, based on site conditions or customer expertise, they would be nice to have or even necessary. The assembly steps will call out the tools required for each step.

TOOL	QUANTITY	SUPPLIED BY
Drill Bit, 3/8 in. (for electric drill)	1	RGS
1.9" OD Ground Post Driver	1	RGS
Magnetic Driver, 5/16 in.	1	RGS
Marking Spikes, 6 in. x 3/8 in.	1	RGS
Mason Line, 225 ft.	1	RGS
Positioning Jig (wood)	1	RGS
Extension Cord (length as required)	1	Customer
Circular Saw	1	Customer
Drill (adjustable clutch/torque optional)	1	Customer
Level, Torpedo	1	Customer
Level, 2 ft.	1	Customer
Level, 4 ft.	1	Customer
Line Level	1	Customer
Pickaxe	1	Customer
Pipe Wrench, 14 in.	1 Each	Customer
Ratchet w/ 7/16 in. Socket & 1/2 in. Deep Socket	2	Customer
Quick Grip Bar Clamp, 6 in.	Pair/Person	Customer
Safety Glasses	1	Customer
Shovel, Round Point	1	Customer
Sledgehammer, 8 to 10 lb.	2 Each	Customer
Stepladder, 8 & 10 ft. (12 ft. optional)	1 to 2	Customer
Tape Measure, 25 ft. (30 ft. optional)	1	Customer
Tape Measure, 100 ft. (non-stretching)	Pair/Person	Customer
Work Gloves	1	Customer (optional)
Breaker/Digging Bar	1	Customer (optional)
Powered Post Hole Auger (rental item)	1	Customer (optional)
Site Level or Transit (rental item)		

### Optional Tools

A Site Level/Transit provides quick and superior accuracy for site preparation and ground post positioning.

A Breaker/Digging Bar can be used to provide a pilot hole for ground posts and to probe the subsoil for potential obstructions.

A Powered Post Hole Auger makes quick, accurate ground post holes and is a back saver in rocky soils. It is available at most tool rental stores for a reasonable fee.

## Parts List

Refer to the packing/picking list for exact quantities of items marked here as “As Required.” Quantities vary due to exact greenhouse length and width.

ITEM #	QUANTITY	DESCRIPTION
1	4	RGSxx001N - 2” OD Half End Bow (30’ or 34’ wide)
2	As Required	RGSxx002N - 2” OD Half End Bow (30’ or 34’ wide)
3	As Required	RGSRPL - 1.315” OD Ridge Purlin, 20’9” Long, holes drilled every 4’ (5’ if 5’ Bow Spacing), swedged end
4	As Required	RGSRPS - 1.315” OD Ridge Purlin, Short (length variable), holes drill every 4’ (5’ if 5’ Bow Spacing)
5	As Required	FC21269 - 5/16” x 4” Carriage Bolt
6	As Required	RGSGP – 2” OD Ground Post
7	As Required	Baseboard, 2 x 6 min., 2 x 10 recommended (Customer supplied)
8	As Required	FC21271 - 5/16” x 4 ½” Carriage Bolt
9	As Required	FC0163104 - 5/16” Hex Nut
10	As Required	FC21263 - 5/16” x 2 ½” Carriage Bolt
11	As Required	J4PN0170 - Cross Connector, 2in. x 1 3/8 in
12	1	PBM1002 - 1.9” Ground Post Driver
13	10	HD065PK - 6” x 3/8” Marking Spike
14	1	FC0589974 - 225’ Roll Mason Line
15	1	RGSAJ - Positioning Jig (wood)
16	1	FC53025 - 3/8” Drill Bit
17	1	FC61007 - 5/16” Magnetic Driver (for drill)
18	As Required	FC31818 - #12 x 1” Self Drilling/Self Tapping Tek Screw
19	As Required	FC21259 - 5/16” x 1 ½ ” Carriage Bolt
20	As Required	RGSRC - 2” OD Ridge Connector
21	As Required	RGSxx003 - 1.315” OD Truss Support
22	As Required	RGSxx004 - 1.315” OD Truss Brace
23	30’ has 4; 34’ width has 6	RGSSEPD - 1.315” OD Side End Purlin, Long, 1 hole, swedged end
24	As Required	21’ lengths of swedged tube - 1.315” OD Side Middle Purlin, no holes
25	As Required	RGSSEPS - 1.315” OD Side End Purlin, Short, (length variable), 1 hole
26	As Required	HBB200E - 2” Brace Band
27	As Required	HBB138E - 1 3/8” Brace Band
N/A	8	RGSWB – Wind Brace (54”) or RGSWB5 (64”) if 5’ Bow Spacing

## **STEP # 1**

### **Inventory Parts**

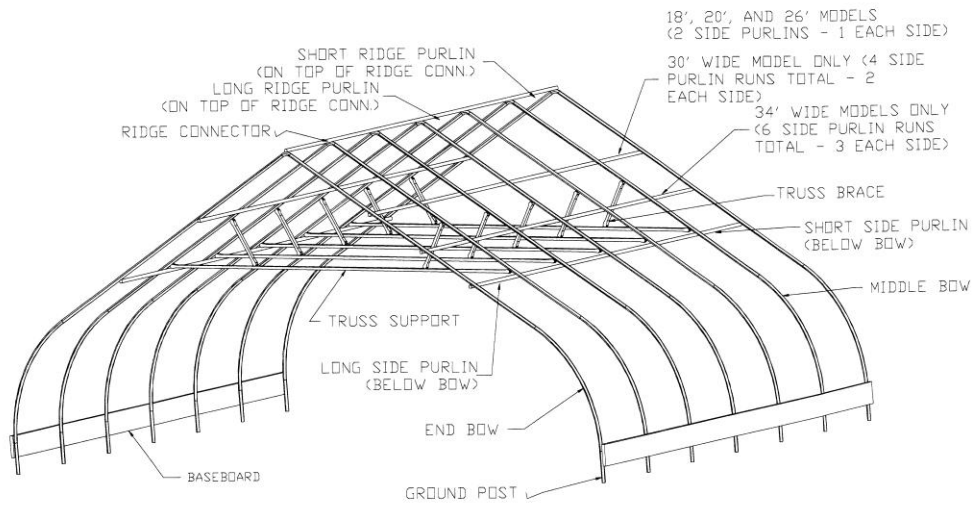
Using the packing, picking and parts lists, inventory the shipment to ensure you have all of the greenhouse components and hardware. Quantities and items are dependent on greenhouse length and width. **Figure One** identifies the structural parts of the greenhouse frame, to help you visualize where the parts are used. **Figures Two, Three, and Four (Illustrated Parts List)** provide an aid to the visual identification of the parts. **Item 1, Half End Bows**, are banded together to distinguish them from the intermediate bows. **Item 2, Half Middle Bows**, are also banded together separately from the gable end bows. The end bows are color coded on the ends of the bows to distinguish size: orange for 30' and green for 34'.

Similarly, **Item 3, Ridge Purlin, Long; Item 23, Side End Purlin, Long; and Item 24, Side Middle Purlin, Long**, are banded separately to help you distinguish them from one another. Smaller parts, such as fastening hardware, are bagged and packaged together within one or two boxes.

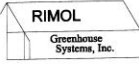
Only items referred to in these assembly instructions for your greenhouse frame are included on the parts list. Other optional components of your greenhouse, for example, heaters, fans, shutters, thermostats, poly film, and irrigation equipment may ship separately and will be noted as "DS" with a date next to it on the packing list. This means that the item is being direct shipped from our supplier directly to you on the date that is listed next to the item. We make every effort to comply with your delivery requests, and try to time separate shipments to arrive within a week of other shipments. Unfortunately, unforeseen shortages or other uncontrollable events may make this impossible. If it does, we'll let you know when the product is expected to ship. These items come with their own packing lists and installation instructions. **Carefully inspect all direct shipped items that come via common carrier for damage. If damaged, do not accept the shipment. Notify your sales person immediately so that we can expedite replacements.** Please refer to your final quote or invoice to verify that you have received all the line items of your order.

Through continuous quality improvement programs, we are always evaluating and improving our manufacturing processes. Still, for whatever the reason, you may inventory the shipment and discover a missing part. Call your respective sales person listed on the preceding page and we will make every effort to get the missing item shipped out to you (by UPS if possible) the same day.

## INVENTORY OF PARTS



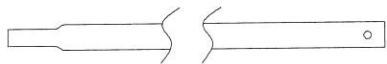
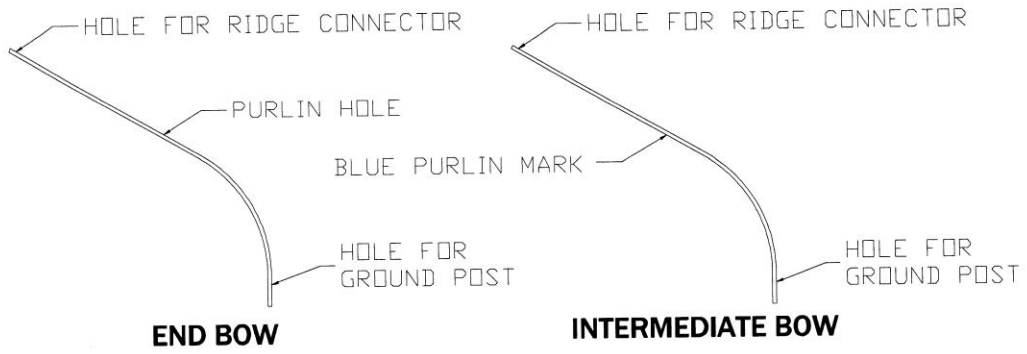
**FIGURE 1**

DRAWN BY: CHERI DEDDY		
DATE: 3/22/00		
DESCRIPTION:		DRAWING NAME: FIGURE1
PURLIN INSTALLATION		

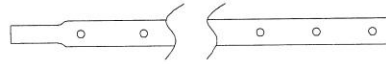
B	TOP PURLIN MOVED	11/03/03
A	RELEASED PER RIMOL	04/05/00

# ILLUSTRATED PARTS LIST

**FIGURE 2**



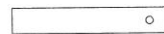
**SIDE END PURLIN LONG**



**RIDGE PURLIN LONG**



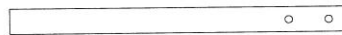
**SIDE MIDDLE PURLIN**



**RIDGE END PURLIN SHORT**



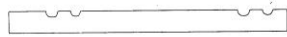
**SIDE END PURLIN SHORT**



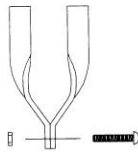
**GROUND POST**

# ILLUSTRATED PARTS LIST

**FIGURE 3**



**POSITIONING JIG**



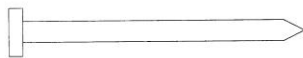
**CROSS CONNECTOR**



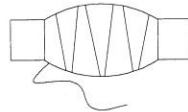
**TRUSS BRACE**



**RIDGE CONNECTOR**



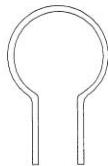
**MARKING SPIKE**



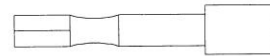
**ROLL MASON LINE**



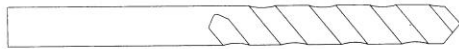
**GROUND POST DRIVER**



**2" OR 1 5/8" BRACE BAND**



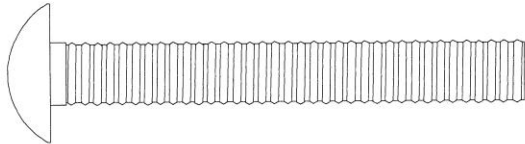
**MAGNETIC DRIVER FOR DRILL**



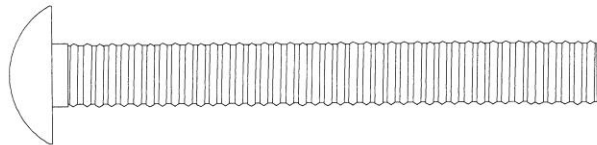
**3/8" DRILL BIT**

## ILLUSTRATED PARTS LIST

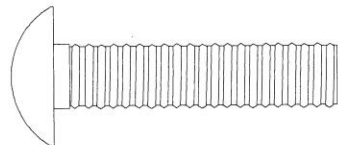
**FIGURE 4**



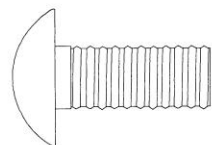
**5/16" x 4" CARRIAGE BOLT**



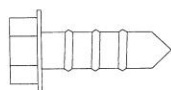
**5/16" x 4 1/2" CARRIAGE BOLT**



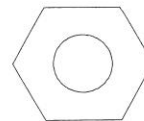
**5/16" x 2 1/2" CARRIAGE BOLT**



**5/16" x 1 1/2" CARRIAGE BOLT**



**#12 X  $\frac{3}{4}$ " SELF DRILLING  
SELF TAPPING TEK SCREW**



**5/16" HEX NUT**

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## **STEP # 2**

## *Site Preparation*

There is no substitute for good site preparation. The area selected for the greenhouse site should be well drained, free of vegetation, large surface stones, and debris. Ground posts must be driven into the ground a minimum of 24 inches (and sometimes even deeper, if the extended ground post option is selected), so any known subsurface obstructions that would interfere with ground post installation must be removed. These steps are best done several weeks before the greenhouse is installed, so that any disturbed soil will compact again. We recommend locating the greenhouse a minimum of at least 12 feet away from adjacent greenhouses, objects, structures, and trees, to prevent shading and/or potential damage to the greenhouse. Plan for heavy snows, if applicable, and think of how you will remove snow between greenhouses (one reason we recommend a 12' spacing is to facilitate snow removal between houses). If you have not already done so, check local zoning and building ordinances regarding setback and clearance requirements for your greenhouse.

Your site should be as level as possible; a **transit** or **site level** (optional) is very useful in determining level. Fill in low spots and grade high points to make surface uniform. Your greenhouse should be as level as possible along the width dimension. A slight pitch, sloping away from the greenhouse, is desirable to allow for runoff of any surface water within the greenhouse. The change in grade should not exceed  $\frac{3}{4}$ " per every 12'.

Use an acceptable type of fill for the location of the greenhouse. This depends on soil conditions and drainage. Consult the company that will be providing you the fill. Typical types of fill include bank run, course sand, gravel and other materials that pack well and have good drainage.

Consider how you will provide water, power, and telephone/data transmission lines to your greenhouse. Many greenhouse owners install a 5-inch pipe underground to run these lines through, allowing for easy access to them when expanding, or if a problem arises. Whether or not you choose to do so, draw a site map that notes the exact location of all known underground utilities installed by you or a utility company. For your own safety, dial 1-800-DIG-SAFE before digging; they will contact the applicable utilities to send people out to mark the location of underground utilities. This service is free of charge in most areas.

## **STEP # 3**

### **Ground Post Layout**

In this step, you'll identify the location of, square, and install the four **corner Ground Posts**. You'll need:

- **Item 6, Ground Post, 1.9" OD**
- **Item 12, Ground Post Driver for 1.9"OD Posts**
- **Item 13, Marking Spike, 6 in. x 3/8 in.**
- **Item 14, Mason Line, 325 ft.**
- **25 ft. Tape Measure**
- **100 ft. Tape Measure**
- **Sledgehammer, 8 to 10 lb.**
- **Safety Glasses**
- **Torpedo or 2 ft. Level**
- **Permanent Marker**
- **Powered Post Hole Auger (optional rental item)**
- **Site Level or Transit (optional rental item)**
- **Batter Boards (5' long scrap lumber or stakes)**

Refer to *Figure 8* if you have extended ground posts: RGS2EGP to RGS4EGP. Use of concrete footings is recommended.

Refer to *Figures 5 & 6* to complete this step.

- Determine the direction in which you want to orient the greenhouse. Optimal growing conditions are achieved when this style of greenhouse is oriented on an east-west axis. However, a freestanding greenhouse works well in all orientations.
- Using **Sledgehammer**, drive **Item 13, Marking Spike** into ground where you want to position the *left front* corner ground post.
- Using a **25 ft. Tape Measure**, measure directly across from the left front marking spike the *width* of your greenhouse (30' or 34') and drive marking spike into the ground to mark position of the *right front* corner ground post. **Important note:** The most commonly accepted measurement practice is "on center", which means measuring from the center of a reference point to the center of the next reference point. It doesn't matter how you measure (center to center, outside to outside, etc.) as long as you are *consistent* in your measuring practices.
- Next, measure out one foot beyond the marking spikes (see *Figure 5*) in both the width and length axes and install **batter boards** by driving them 18 inches

into the ground. Securely tie **Mason Twine** to the batter boards across the width axis, ensuring that the twine is located across the center of the spike.

- Now, measure out the length of your greenhouse from the center of the front spikes. Drive spikes into the ground to mark the location of the **left rear** and **right rear** corner ground posts. Install the rear batter boards as you did the front ones, and tie mason twine tautly from front to back along both length axes and the remaining rear width axis. The width and length twines should intersect across the center of all the spikes.
- To check for square, measure from the left front to the right rear spikes, and from the right front to left rear spikes. Both measurements should be the same. If not, recheck your width and length measurements and reposition spikes accordingly.
- Mark **Item 6, Ground Post**, 8 inches down from the top of the post if using 2 in. x 6 in. baseboards (mark at 12 in. if using 2 in. x 10 in. baseboards) with **Permanent Marker**. The top of the post is the end with two predrilled holes.
- Using **Item 12, Ground Post Driver, Sledgehammer**, (optional **Powered Post Hole Auger** or **Digger/Breaker Bar** can be used to open or start post hole), and ground posts, install the left and right front corner ground posts. Center post over spike, with twine lines on the **outsides** of the posts, twist slightly to mark location in soil surface, then remove marking spike. Orient posts so that the predrilled holes face the inside and outside of the greenhouse (you will attach the bows and baseboards through these holes in later steps). Set ground posts into soil mark, slip ground post driver into ground post and drive posts into the ground to the mark you made on the posts (the twine lines should intersect the center of the post). With the **Torpedo** or **2 ft. Level**, check for level on top of and two sides of the ground post once or twice as you drive it and again when it is fully driven.

Now you'll use a triangulation method (or the optional **Site Level** or **Transit**) to recheck the position of the left rear corner ground post and square it with the other corner posts. Refer to **Figure 6**; which shows the on center and the inside/outside methods measurements. Use either method, **but be sure to use the same method throughout**.

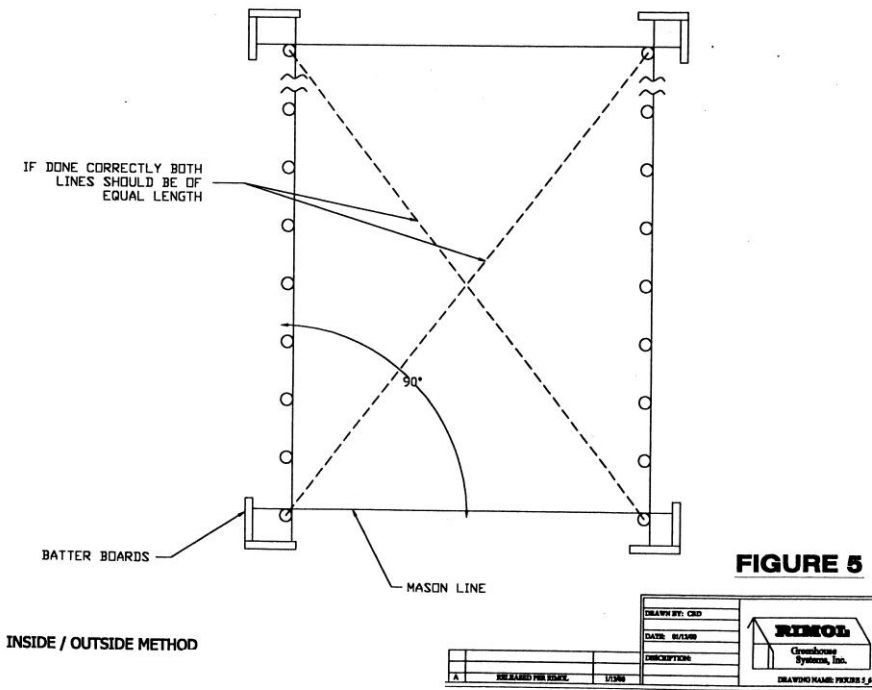
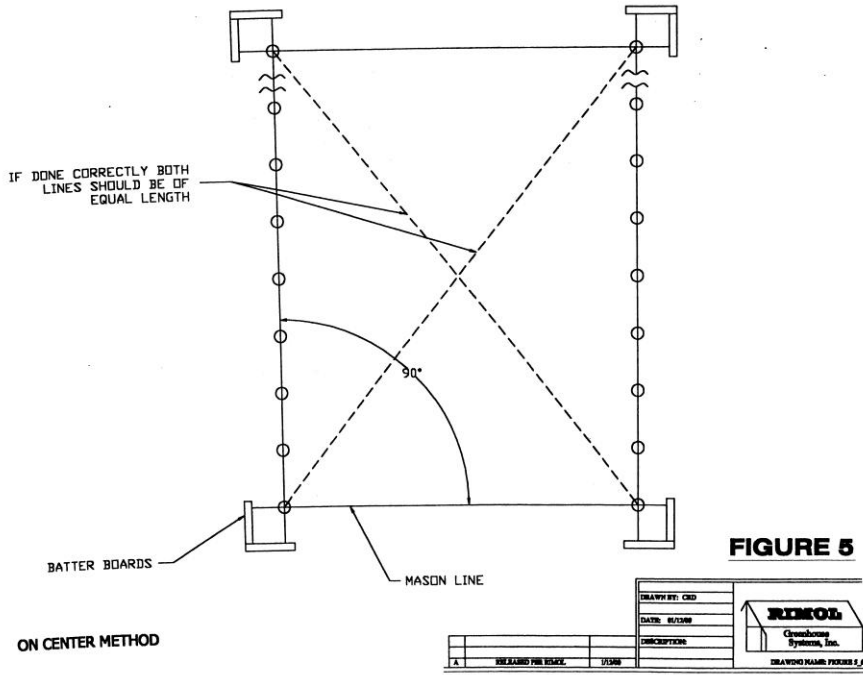
- Using **Item 14, Mason Line**, tie a line from the left front ground post to the right front ground post; tie it tightly.
- Using a 25 ft. tape measure, measure from the left front ground post (Point A) to the right front ground post. At the 12-foot mark (Point C), drive a marking spike into the ground; make sure it is aligned with the line.
- Now measure from the left front ground post in the direction of the left rear ground post. At the 16-foot mark, drive a marking spike into the ground (Point B).

- Measure from Point C to Point B; if square, this should equal 20 feet. If it doesn't, recheck your measurements. It's helpful to verify the measurement from Point A to Point C (12 feet), then use two tape measures (either two 25 ft tape measures and/or the **100 ft. Tape Measure**) – one from Point A to Point B (16 feet), the other from Point C to Point B (20 feet). You may need another person or two to do this. The point where these two measurements intersect is Point B, and proves that the line from the right front to left front ground posts is square with the line from the left front ground post to Point B.
- Using the 100 ft. tape measure, extend the left front ground post/Point B line to recheck the position of the left rear marking spike. Example: if your greenhouse were 96 feet long, you would measure along the line until you reach the 96-foot mark. Since the measurement of the ground post is from the outside edge to the inside edge [or on center from post to post], house length is always the stated length plus two inches).
- Install the left rear ground post as you installed the front ground posts.

Use this triangulation method on the opposite side to recheck the position of the right rear corner ground post and install the post as described above.

As a last check for square, measure diagonally from the right front to left rear ground post, and from left front to right rear ground post (make all measurements from the *outside* of the posts). The measure should be equal, although a 1 to 2 inch difference is acceptable.

Well done! You've just completed the most important and challenging step in erecting your new greenhouse.





## **STEP # 4**

### **Ground Post Installation & Alignment**

With the four corner posts now installed and squared, the next step is to install and align the remaining ground posts. This step is best accomplished with two people. For this step, you'll need:

- **Item 6, 1.9" OD Ground Post**
- **Item 12, Ground Post Driver for 1.9" OD Post**
- **Item 14, Mason Line, 325 ft.**
- **Item 15, Positioning Jig (wood)**
- **Torpedo or 2 ft. Level**
- **4 ft. Level**
- **Sledgehammer, 8 to 10 lb.**
- **Tape Measure, 100 ft.**
- **Safety Glasses**
- **Permanent Marker**

Refer to *Figure 7* to complete this step, which illustrates both the on center and inside/outside methods. **Be sure to continue using the same method you used in Step # 3.**

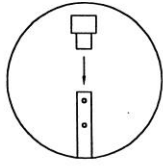
Refer to *Figure 8* if you have extended ground posts: RGS2EGP to RGS4EGP.

One person can perform this step; however, two or more people are recommended due to the strenuous nature of the work and the need to do multiple measurements, as the ground posts are set. **This is a very important step, so take the time to do it correctly.**

You may run into the situation where the ground post you are driving meets with a very large subsurface stone that cannot be removed. If this happens with ground posts other than the corner ground posts (which must be installed at the full depth specified), it is an acceptable practice to cut off up to a foot of the bottom of the ground post to accommodate the subsurface obstruction. A reciprocating saw fitted with a metal cutting blade works well in cutting ground posts to size, or you can use a Portaband; either of these tools can be rented. You do want to check which way the obstruction is running before you cut a post, as you never want to cut consecutive posts short. Use the **Digging/Breaker Bar** or other tool to probe the subsurface to determine the size of the obstruction and insure it doesn't run under where the next post is to be placed. If it does, you will have to either remove the stone or drill through it to accept the next post.

- Using **Item 14, Mason Line**, run a length of line from the left front batter board to the left rear batter board, and another length between the right front and the right rear batter boards. Align the twine so that it intersects the upper hole of the ground post. Be sure the line is tight and secure, as it will act as your guideline for aligning and setting ground post height.

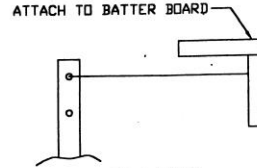
- Using the 100 ft tape measure, mark the mason twine at 4 foot increments with the permanent marker to indicate the ground post positions. Do this on both the left and right sides.
- Line up a ground post adjacent to the left front corner ground post, and lined up with the mark on the twine. The predrilled holes in the ground post should face towards the inside and outside of the greenhouse.
- Using **Item 12, Ground Post Driver**, and **Sledgehammer** (or optional **Powered Post Hole Auger** or **Digger/Breaker Bar** to open/start post hole), drive the ground post into the ground. While driving post, stop once or twice to check level using the **Torpedo** or **2 ft. Level** on at least two sides of the post, and again when it is fully driven; correct as needed to bring into level (Tip: wedging small stones against the base of the post and striking them with the sledgehammer in the direction of level can help bring a partially driven ground post back to level). The ground post should be even with the line and level on at least two sides when fully driven. It should be firmly in the ground; if there is any play, wedge stones near the base of the ground post at the soil line to hold it firm. If you are driving into very sandy soil, the ground posts may require concrete around the subsurface portion of the post to hold it firmly in the ground. If so, excavate post hole to a depth of 24 inches and a diameter of 12 inches. Insert ground post into hole and backfill hole with concrete. Check that ground post is level after the concrete has been poured by using torpedo level on top and at least two sides. Support the ground post with batter boards to insure it remains level while the concrete cures.
- Use the **4 ft Level** to check level between the left front ground post and the newly installed ground post; reposition post if necessary to bring into level with the left front ground post. You may also opt to use a line level attached to the twine, a method that works equally well.
- Repeat the above steps to install the remaining ground posts on both sides of the greenhouse.



Use Ground Post Driver to install the Ground Posts

ON CENTER METHOD

ALL VIEWS FROM THE OUTSIDE OF GREENHOUSE



Detail "A"  
Twine attachment

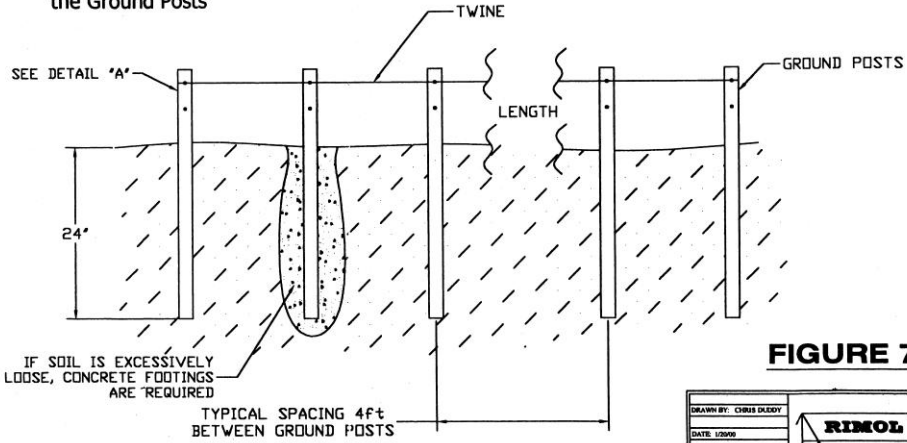
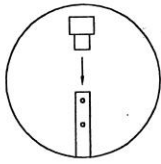


FIGURE 7

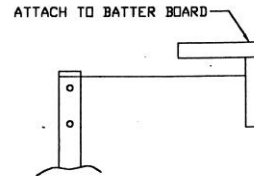
DRAWN BY: CHRIS DUDY		
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REVISION FOR RIMOL	09/2000	DRAWING NAME: FIGURE7
REVISION FOR RIMOL	10/2000	



Use Ground Post Driver to install the Ground Posts

INSIDE / OUTSIDE METHOD

ALL VIEWS FROM THE OUTSIDE OF GREENHOUSE



Detail "A"  
Twine attachment

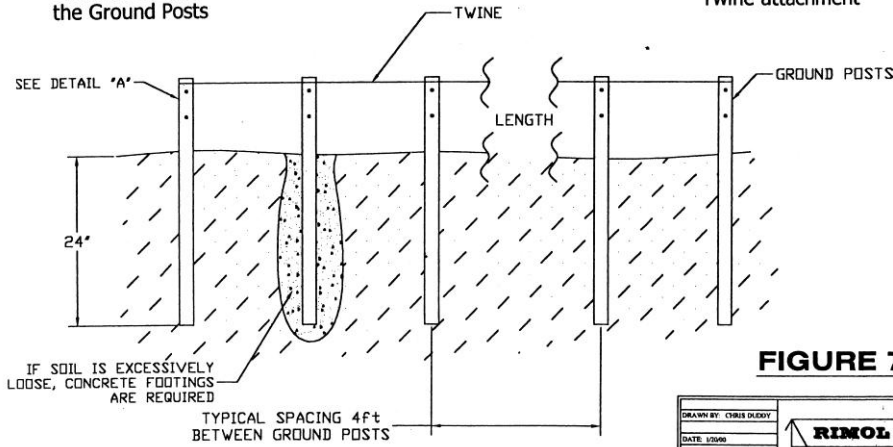


FIGURE 7

DRAWN BY: CHRIS DUDY		
DATE: 12/99		
DESCRIPTION:		
REVISION FOR RIMOL	09/2000	DRAWING NAME: FIGURE7
REVISION FOR RIMOL	10/2000	

# EXTENDED GROUND POST

NOTE: IT IS RECOMMENDED WITH 2' TO 4' ADDITIONAL HEIGHT GROUND POSTS TO USE 8"-12" DIAMETER FOOTINGS APPROXIMATELY 2' IN DEPTH. THIS WILL ALLOW YOU TO DRIVE GROUND POST INTO SOIL, THEN BACKFILL WITH CONCRETE FOR ADDITIONAL STABILITY. THIS IS VERY IMPORTANT FOR BOTH SNOW AND WIND LOADS.

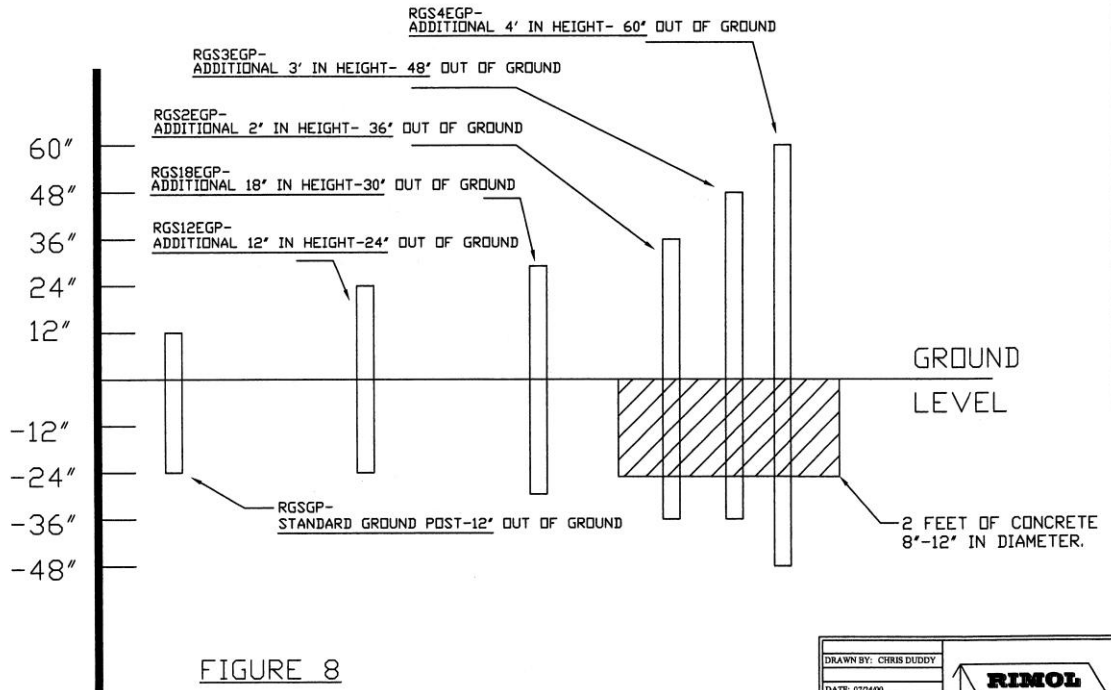


FIGURE 8

	DRAWN BY: CHRIS DUDDY
	DATE: 072400
	DESCRIPTION:
A	RELEASED PER RIMOL 072400

DRAWING NAME: XGRDPOST

# **Attention**

If you have purchased a ridge vent for your greenhouse, on the vent side, item #20 (ridge connector), replace Item # 10 (5/16" x 2 1/2" carriage bolt) with Item #11 (3/8" x 2 3/4" hex head bolt) provided with the ridge vent assembly kit.

Do not install the hex nut on the bolt. This will facilitate the assembly of the vent braces when you build the ridge vent after completing the frame assembly.

If you do not have a ridge vent, skip this step.

## **STEP # 5**

### **Assemble & Install Bows, Truss Supports & Braces, and Ridge Purlins**

In this step, you will assemble the half end bows and half middle bows together using ridge connectors. You will then install the completed end and middle bows into the ground posts. Finally, you will attach the truss supports and truss braces to the assembled middle bows. This step requires two to three people. For this step, you'll need:

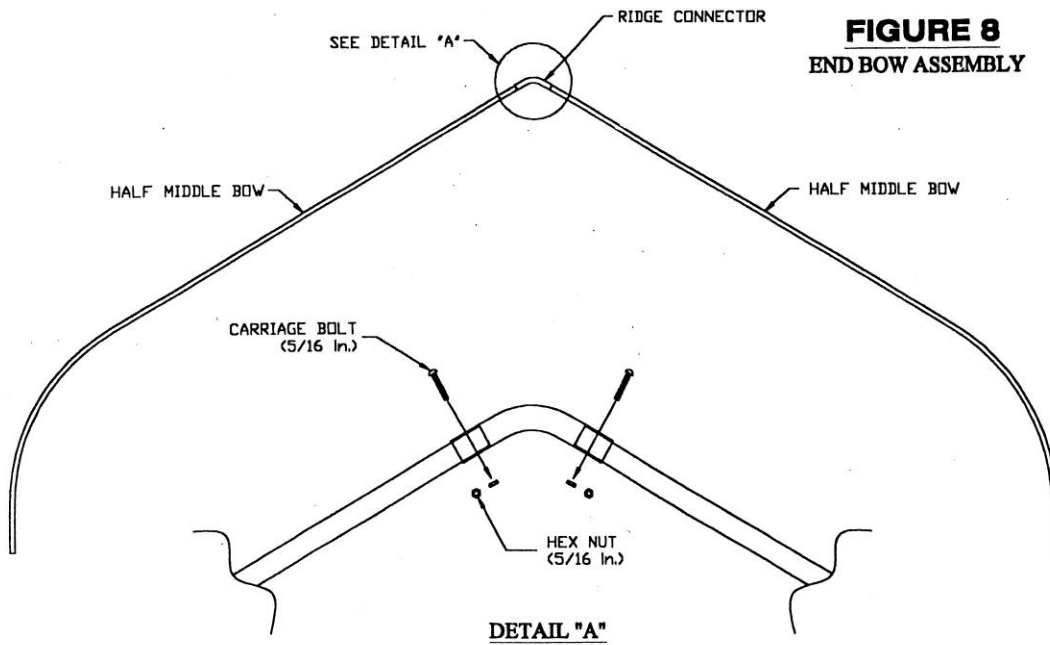
- **Item 1, Half End Bows and Item 2, Half Middle Bows**
- **Item 9, 5/16" Hex Nut**
- **Item 10, 5/16" x 2½" Carriage Bolt**
- **Item 13, 6" x 3/8" Marking Spike**
- **Item 19, 5/16" x 1 ½ " Carriage Bolt**
- **Item 20, 2" OD Ridge Connector**
- **Item 21, 1.315" OD Truss Support**
- **Item 22, 1.315" OD Truss Brace**
- **Item 26, 2" Brace Band**
- **Item 27, 1 3/8" Brace Band**
- **Electric Drill and Pipe Wrench, 14 in.**

#### **Bow Assembly**

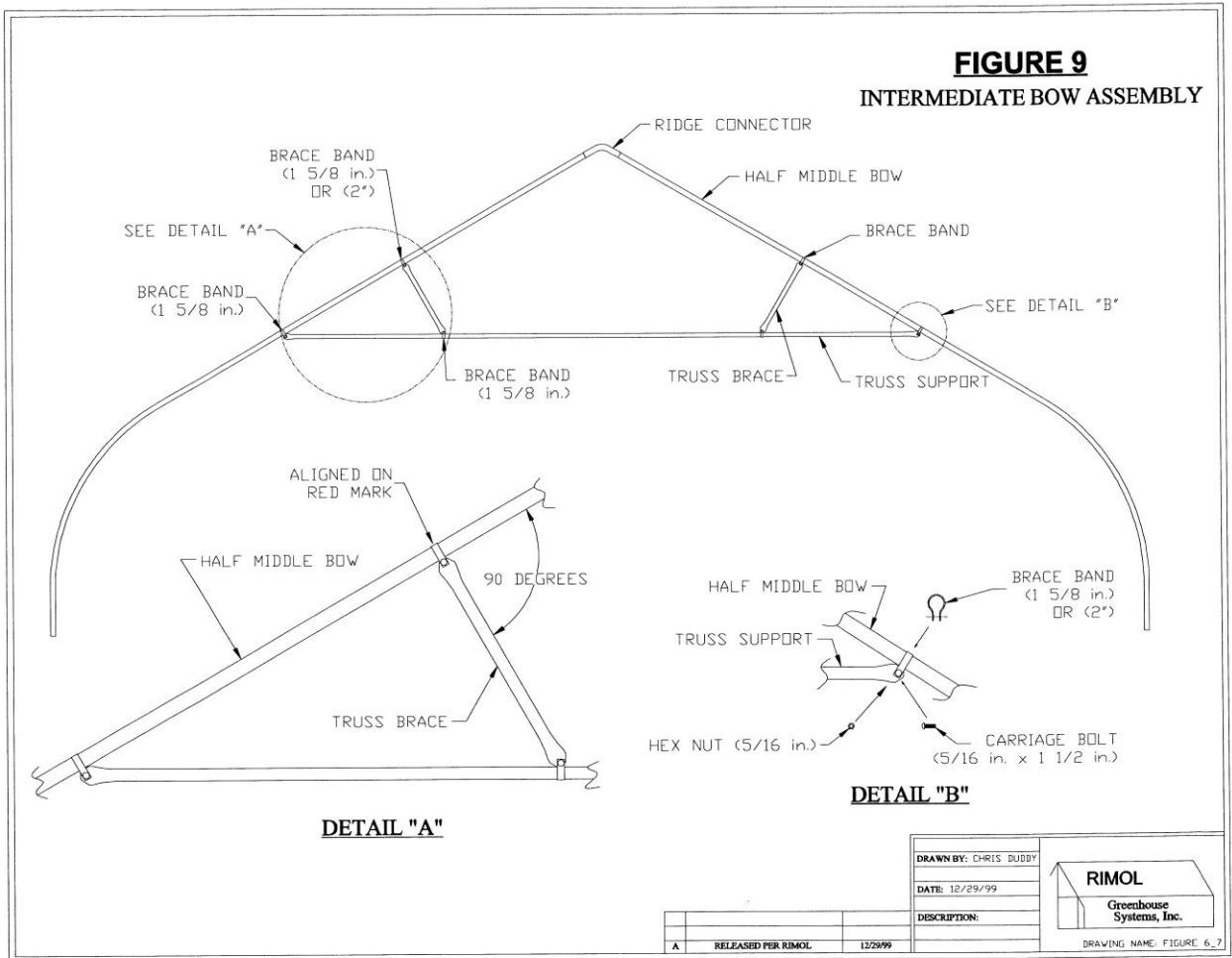
Refer to *Figures 8 & 9* to complete this step. We recommend that you layout the half bows with the ends of the bows adjacent to the ground posts, and the tops of the bows pointing into and towards the back of the greenhouse. Place a ridge connector near the junction of the half bows. Start at the front of the greenhouse with (2) half end bows (they are distinguished by their predrilled holes [in three places on the 34' wide model, in two places on the 30' wide models as well as colored tips on all models] for purlin attachments; the intermediate bows do not have this feature).

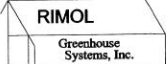
- **Note: if you had to dig a trench to install ground posts, it is acceptable to attach the baseboard to the ground posts to prevent the bows from falling over due to the unstable ground.**
- Start with the front end bow. Refer to *Figure 8*. Assemble two of **Item 1, Half End Bows** together by inserting them into **Item 20, Ridge Connector**. Align the predrilled holes in the ridge connector with the predrilled holes in the half end bows. Fasten the ridge connector to the half end bows using two each of **Item 10, Carriage Bolt (5/16 in. x 2 ½ in.)** and **Item 9, Hex Nut (5/16 in.)**. Insert carriage bolt through top of the ridge connector so that threads are inside the greenhouse. Thread hex nut onto bolt and *tighten*.

- With one person on either end of assembled gable end bow, lift bow and slip one end of the bow into the right front ground post until it rests on marking spike.
- Now insert the other end of bow into the left front ground post. Because the bow is engineered to be flexible, you may have to pull the bow slightly in the direction of the post to allow it to slip into the post.
- Loosely secure the bow to the ground posts, using **Item 10, Carriage Bolt (5/16 in. x 2 1/2 in.)** and **Item 9, Hex Nut (5/16 in.)**. Align the predrilled holes in the ground post and bow to accept the carriage bolt; you may need to twist the ground post slightly with the **Pipe Wrench** to make the holes align properly. From the outside of the ground post, slide the carriage bolt through the *upper* hole of the ground post and bow so that the threads of the carriage bolt face the inside of the greenhouse; *hand tighten* the hex nut onto the bolt. If the carriage bolt does not go through the predrilled holes easily, do not force it – you will damage the carriage bolt threads. Use **Item 16, Drill Bit, 3/8 in.** and **Electric Drill** to re-drill the hole from the inside to the outside. This will correct minor misalignments if you cannot align the predrilled holes by twisting the ground post with the pipe wrench.
- Remove marking spikes from the lower predrilled holes of the posts and slip them into the next set of posts.
- Now assemble the middle bows; refer to **Figure 9**. Slip two of **Item 26, 2” Brace Bands** onto each half middle bow and center them over the green lines marked on the inside of each half middle bow. Orient brace bands so that the open end of the bands face the interior of the greenhouse. Assemble two of **Item 2, Half Middle Bows**, together by inserting them into a ridge connector. Align the predrilled holes in the ridge connector with the predrilled holes in the half middle bows. Fasten them together the same way you fastened the ridge connector and half end bows.
- Lift assembled middle bow and insert into next set of ground posts. Fasten as you did with the end bow installation, and repeat until all the bows are assembled.



**FIGURE 9**  
**INTERMEDIATE BOW ASSEMBLY**



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DESCRIPTION:		
A RELEASED PER RIMOL 12/29/99		
DRAWING NAME: FIGURE 6.7		

## Install Ridge Purlins

Next, you will install the long and short ridge purlins that run along the top of the greenhouse. This assembly requires a minimum of 2 people. For this assembly, you'll need the following items:

- **Item 3, Ridge Purlin Long, swedged end**
- **Item 4, Ridge Purlin, Short (length variable)**
- **Item 5, 5/16" x 4" Carriage Bolt**
- **Item 9, 5/16" Hex Nut**
- **Ratchet with 7/16 in. Socket**
- **Electric Drill**
- **10 ft. Stepladders**

Refer to *Figures 10, 10a, & 11* to complete this assembly.

Start with the front end bow and work sequentially, bow by bow, towards the rear end bow. Start with the ridge purlin run first. Attach **Item 3, Ridge Purlin, Long** and **Item 4, Ridge Purlin, Short** first.

**NOTE:** The ridge purlin is installed over the ridge connector. Installing the ridge purlin over the ridge connector gives the ridge a more peaked profile. Installing the ridge purlin under the ridge connector is not recommended because poly can more easily get snagged on a bolt of a ridge connector.

- Position **Item 3, Ridge Purlin, Long** along the greenhouse peak, on top of the ridge connectors; this requires 2 people on **10 ft. Stepladders**. The long ridge purlin has a plain end and a swedged end (the long ridge purlins are distinguished by a predrilled hole in the plain and swedged ends; the long side purlins are *not* drilled through the swedged end). Align the predrilled hole in the plain end of the long ridge purlin with the predrilled hole in the center of the ridge connector. See *Detail C, Figure 11*. With your helper holding the long ridge purlin steady at the other end, attach it to the gable end bow by inserting **Item 8, Carriage Bolt (5/16 in. x 4 in.)** through the purlin and ridge connector so that the bolt threads are inside the greenhouse, Thread **Item 9, Hex Nut (5/16 in.)** onto carriage bolt and *hand tighten*.
- Fasten the long ridge purlin to the ridge connectors as described above to the next *four* middle bows.
- If your greenhouse calls for another long ridge purlin, slide the plain end of the purlin onto the swedged end of the installed long ridge purlin. Insure the swedged end of the long ridge purlin is correctly seated into the next long ridge purlin (the swedged end must be fully inserted into the plain end). Align the predrilled holes in the swedged and plain ends of the purlins with the predrilled hole in the ridge connector and fasten as you did on the previous bows.

- Continue to install the long ridge purlins as instructed above. Finish with the short ridge purlin, which attaches to the last long ridge purlin and bolts through the ridge connector in the same manner as the long ridge purlins were joined. Complete the installation by bolting the short ridge purlin to the rear gable end bow using a 5/16" x 4" carriage bolt and 5/16" hex nut.

## **Truss Support Assembly**

- Slip two of **Item 27, Brace Bands (1 3/8 in.)** onto **Item 21, Truss Support**. If the bands do not slip over the truss supports easily, spread them slightly apart, either manually or with pliers).  
**Note: Truss Supports are not used on end bows.**
- Attach truss support to bow. Align truss support to green reference mark on bow so that the predrilled hole is between the holes on the open end of the brace band. Fasten truss support to bow using **Item 19, Carriage Bolt (5/16 in. x 1 1/2 in.)** and **Item 9, Hex Nut (5/16 in.)**. Insert carriage bolt through brace band, through truss support, and back out through brace band so that the bolt threads face the back of the greenhouse (use pliers to squeeze brace bands together if necessary). Thread hex nut onto bolt and *hand tighten*.
- Fasten two of **Item 22, Truss Braces**, to the truss support and middle bow using four carriage bolts (5/16 in. x 1 1/2 in.) and hex nuts. Orient the truss brace so that it is perpendicular to the bow and aligned with the red reference mark on the bow. Fasten this end of truss brace to bow *first*; align truss brace so that predrilled hole on end of brace is between the holes of the open end of the brace band. Insert carriage bolt into brace band, through the truss brace, and back out of the brace band, so that the bolt threads are facing towards the back of the greenhouse. Thread nut onto bolt and *hand tighten*.
- Align other end of truss brace with truss support so that it is perpendicular with the bow *and there is at least 1/8 in. of clearance between the truss brace and truss support. This may be modified at your discretion to get the desired bow in the truss support depending on use. If you will be applying weight via hanging baskets, you will want a slight bow upwards in the truss support in order for it to absorb the anticipated weight and distribute it to the bows. The red mark is for reference only.* When correctly aligned, this orientation results in the truss brace being at a 90-degree angle between the truss support and middle bow. Attach the end of the truss brace to the truss support in the same manner you attached the other end of the truss brace to the bow.
- Install the second truss brace as you did the first.
- Assemble and install all remaining middle bows as instructed in the above steps.

## **STEP # 6**

### **Install Side Purlins**

In this step, you will install the long and short side purlins that run the length of the greenhouse. This step requires a minimum of 2 people. For this step, you'll need the following items:

- **Item 5, 5/16" x 4" Carriage Bolt**
- **Item 9, 5/16" Hex Nut**
- **Item 11, 2" x 1 3/8" Cross Connector**
- **Item 15, Positioning Jig**
- **Item 18, Tek Screw**
- **Item 23, Side End Purlin, Long (length variable) 1 hole, swedged end**
- **Item 24, Side Middle Purlin (length variable), swedged end, no holes**
- **Item 25, Side End Purlin, Short, (length variable), 1 hole**
- **Ratchet with 7/16 in. Socket and ½ in. Deep Socket and 8 & 10 ft. Stepladders**

Refer to *Figures 10, 10a, & 11* to complete this step.

- **Note: ensure greenhouse is square before attaching purlins.**
- On the 34' wide model, there are six side purlin runs, three on each side of the greenhouse. On the 30' wide model, there are four side purlin runs, two each on either side. They bolt to the gable end bows just like the ridge purlins, except they are attached on the *inside* of the greenhouse. They are fastened to the middle bows with cross connectors. **Item 11, Cross Connector**, consists of two metal straps fastened together around the purlin and bow by two ¼ inch x 1 inch carriage bolts and two ¼ inch hex nuts. See *Figure 11, Detail D*. The inside of the middle bows are marked with *blue* reference lines to indicate where to fasten the purlin to the middle bow with the cross connector. Use the blue reference lines as a guide only; the position of the ground posts greatly affects bow alignment.
- Start with the lower side purlin run on either side of the greenhouse. Attach **Item 23, Side End Purlin, Long** to gable end bow. Align the predrilled hole in the gable end bow with the predrilled hole in the plain end of the long side purlin (*Tip*: if the predrilled holes in the gable end bow and purlin will not align, recheck the plumb of the ground posts with the torpedo level; if not plumb, then the purlin and ridge holes will not align). Attach by inserting **Item 5, Carr Bolt 5/16"x 4"** through the gable end bow, into and through the long side end purlin so that the threads are facing the inside of the greenhouse. Thread a hex nut onto the carriage bolt, and tighten as previously directed.
- Once the long side end purlin is fastened to the end bow, attach the purlin to the next *four* middle bows with cross connectors. Have your helpers hold

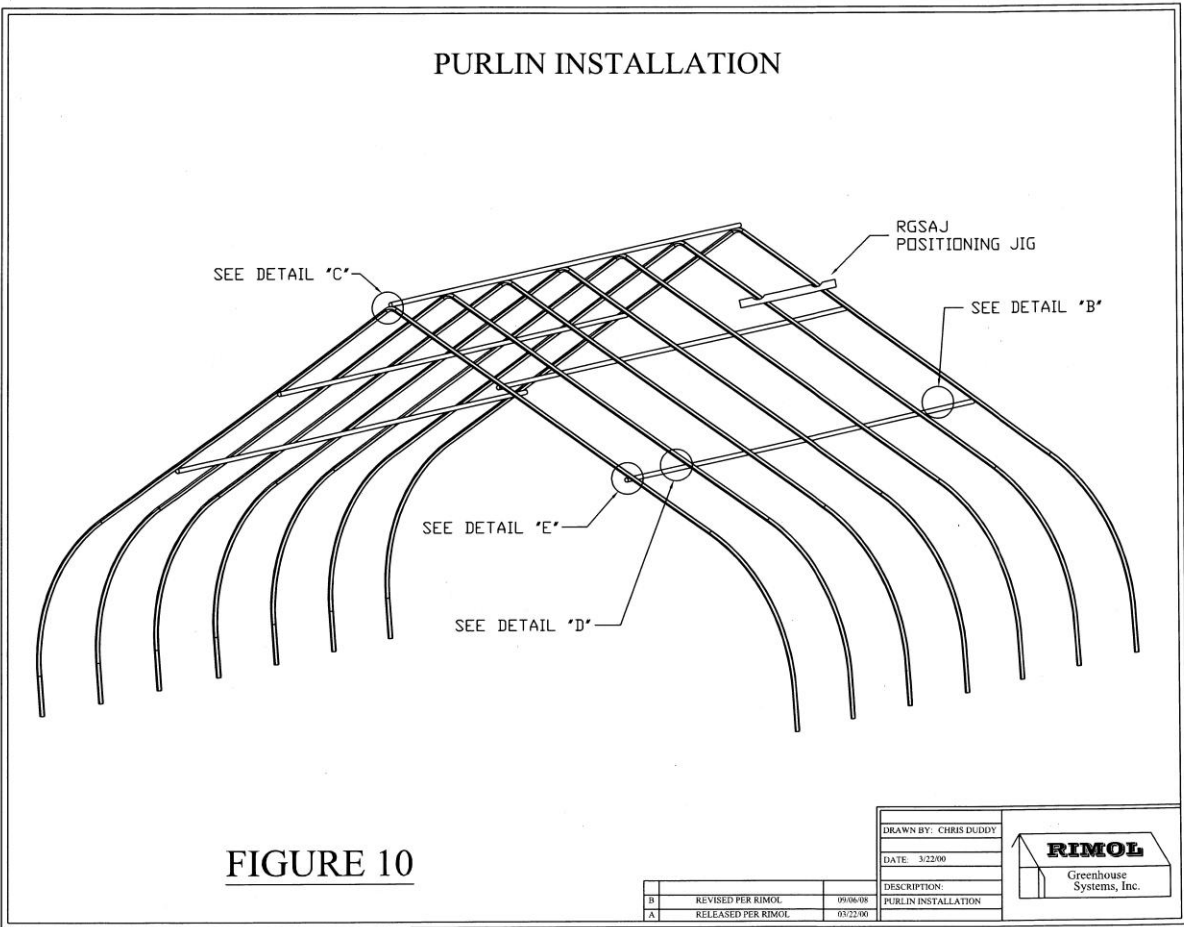
**Item 15, Positioning Jig**, between the front end bow and the adjacent middle bow on both sides of the greenhouse. They should hold the jig chest high on the outside of the greenhouse, with the bows in the center cutouts of the jig. You and your other helper should be inside the greenhouse on **8 ft.**

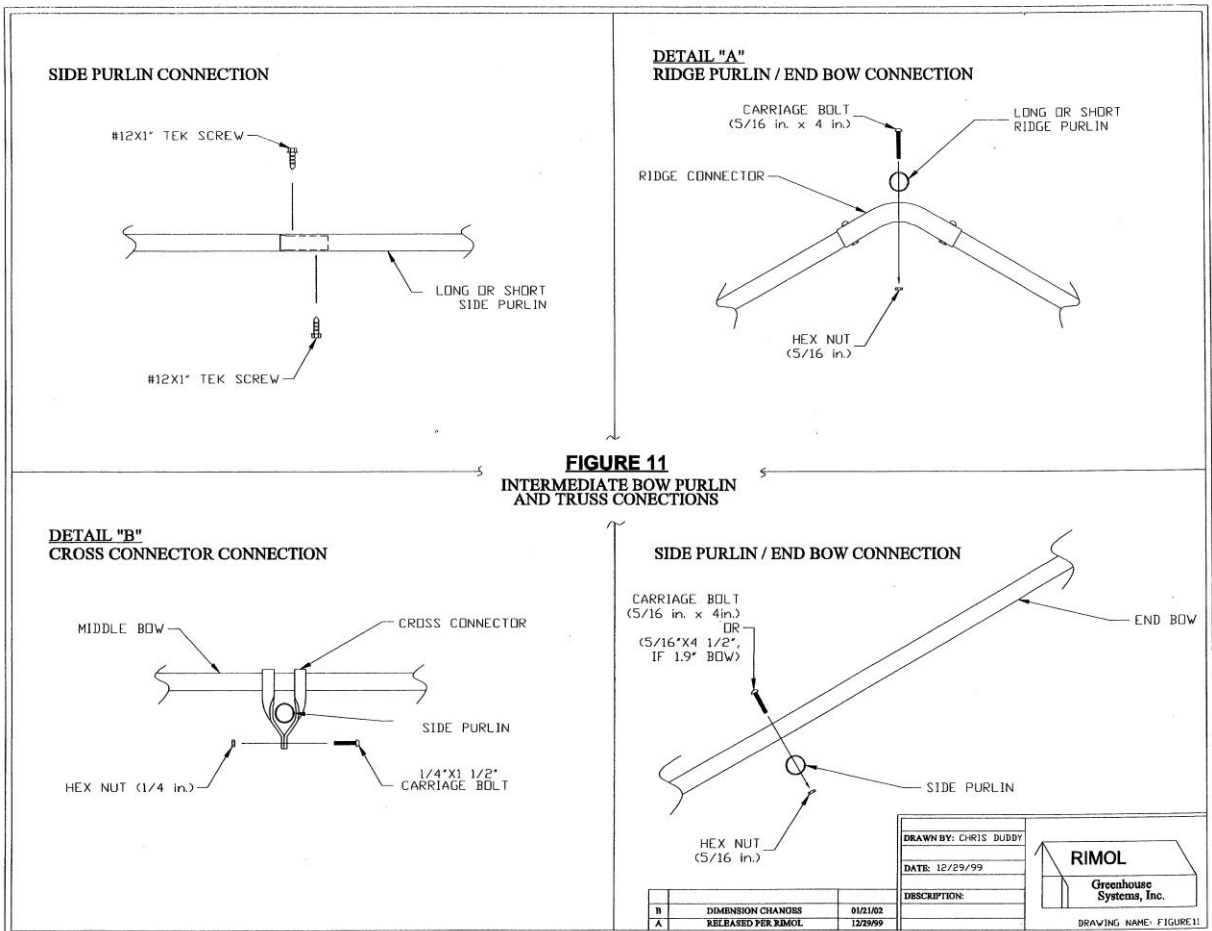
**Stepladders.** Have your helper support the long side end purlin. Align the purlin with the blue line on the middle bow and fasten purlin to the bow with the cross connector. Orient cross connector hardware so that the carriage bolt threads face the floor of the greenhouse. Tighten cross connector hex nuts sufficiently to keep the purlin from slipping, but do not tighten all the way. Continuously observe the perpendicularity and alignment of the bows during assembly; adjust as necessary by repositioning ground posts.

- Move positioning jigs down one bow, and repeat the above step until you reach the end of the long side end purlin.
- When you reach the end of the long side end purlin, insure that the plain end of either the next long middle purlin or **Item 24, Side Purlin, Short** is fully seated into the long side end purlin. Make certain that your helpers have the jigs in place between bows. Attach the long side middle purlin to the long side end purlin or short side end purlin using two **Item 18, Tek Screws** and the electric drill fitted with **Magnetic Driver, 5/16 in.** Tek screws should be placed at one inch and two inches from the purlin union – see **Figure 11, Detail B;** - and oriented downward away from the greenhouse roof. (Tip: when driving Tek screws, start drill slowly, increasing speed as screw bites into the purlin. If your drill is equipped with an adjustable clutch/torque, set the torque setting just below the drill setting. **Do not over tighten**).
- If you joined a long side end purlin and a long side middle purlin together in the above step, continue aligning jigs between bows and installing cross connectors (repeat above step if necessary to connect another long side middle purlin).
- When you reach the point where you connect the short side end purlin to the last long side middle purlin, attach the short side end purlin to the rear end bow as you attached the long side end purlin to the front end bow.
- Repeat above steps to install the other side purlin run/s on the opposite side of the greenhouse.
- Once all the side purlin runs are installed, go back and verify the positioning of the side purlins and cross connectors against the blue lines on the bows.
- Tighten all hardware in the following order; start at the top with the ridge purlin. Tighten using **Ratchet with 1/2 in. Deep Socket.** If using an electric drill equipped with an adjustable clutch/torque setting, set it back five stops from the highest setting. **Do not over tighten the bolts.** The nuts should be a half turn past snug. Tighten all ridge connector hardware after the ridge purlins (use the same ratchet/drill socket setup as you did for the ridge purlin).

Next, tighten all cross connector hardware with ratchet or electric drill fitted with 7/16 in. socket. Lastly, tighten the carriage bolts and hex nuts holding the bows to the ground posts using the ratchet or drill fitted with the 1/2 in. deep socket.

**Tip:** After tightening the ridge connector, ridge purlin, and end bow hardware, apply a layer or two of duct tape over the heads of the carriage bolts. This will prevent the poly film from snagging on them as you adjust the poly film over the frame.





## **STEP # 7**

### **Install Baseboards & Wind Bracing**

The final step of the greenhouse structural framework is to install the baseboards. This step requires two people. For this step you will need:

- **Item 7, Baseboard, 2 in. wide**
- **(2) 2-pipe straps, (4) woodmate screws,(1) tek screw**
- **2 or 4 ft. Level**
- **6 in. Quick Grip Clamp**
- **Ratchet with ½ in Deep Socket**
- **Drill**
- **3/8” Drill Bit**
- **Round Point Shovel**
- **Pickaxe**
- **Splicing Cleats or Metal Wood Splicer (optional)**

Refer to the photos below to complete this step.

We recommend that the baseboard and any other wood used to construct the greenhouse be treated or naturally resistant to decay and insects. Two woods naturally resistant to decay and insects are cedar and redwood, but they are generally very expensive. Wood that has been pressure treated with Copper Chromium Arsenate (CCA) is another acceptable treatment; it is very popular with greenhouse owners and is widely used in the industry. We do not recommend any wood that has been treated with petroleum derivatives, such as creosote, coal tars, or penta. These preservatives outgas fumes that are detrimental to polyethylene coverings and especially to plant health.

**Important Note:** Most lumber is sold in 8, 12, or 16-foot lengths, which are multiples of 4 feet – the same as the typical bow spacing. If installed as is, this will result in splice joints occurring on ground posts – and splices cannot be done on ground posts. To solve this, install baseboards so that they do not end on a ground post. For example, a 2 in. x 6 in. x 12 ft baseboard ends on a ground post, but if you cut it to 10 feet, the splice will end up between bows (many owners use the excess 2 feet as the cleats to make the inter-bow splices).

- If necessary, remove any soil along the outside perimeter of the ground posts with **Round Point Shovel** and/or **Pickaxe** so that **Item 7, Baseboard**, doesn't rest on high points in the soil. Pull any excess soil to the outside of the greenhouse, as you will be banking it back against the baseboard.

- Using two **6 in. Quick Grip Clamps**, clamp baseboard to the outside of the right front ground post and the next adjacent ground post. Position baseboard against ground posts so that when you drill through the predrilled lower hole on the ground post into the baseboard, the resulting hole is at least 1 inch from the bottom and side of the baseboard.
- With **2 ft. Level**, check level of baseboard clamped between the bows. Adjust baseboard and clamps if necessary to bring into level.
- From the *inside* of the greenhouse, attach (2) 2-hole pipe straps with (4) woodmate screws and only (1) tek screw through one set of 2-hole pipe straps
- Repeat above three steps for the next two ground posts, moving bar clamps as necessary.
- Now splice installed baseboard with next baseboard section. Use wood cleats made from excess baseboard material, check level, and fasten either joiner with wood screws that are an appropriate length for the work. If you are using wood cleats, install them on the surface that faces the inside of the greenhouse, as the outside surface will be used to attach your poly fastening system.
- Move bar clamp from right front ground post and clamp baseboard to third ground post. Check level, drill hole, and install hardware as directed above. Repeat above steps until baseboards are installed on both sides of greenhouse.
- Bank soil against the inside and outside of the baseboard to fill any gaps between the baseboard and the ground.

Congratulations! Your greenhouse frame is now ready for end wall framing, as well as installation of the other components required for an operational greenhouse. The following sections of this manual cover the installation of these components. Depending on the options you selected for your greenhouse, some of these installation instructions may not apply to you. **Tip:** if you are using a large oil fired heater, now's a good time to move it inside of the greenhouse before you frame the end walls – there's a lot more room to maneuver this bulky item around at this stage of construction.

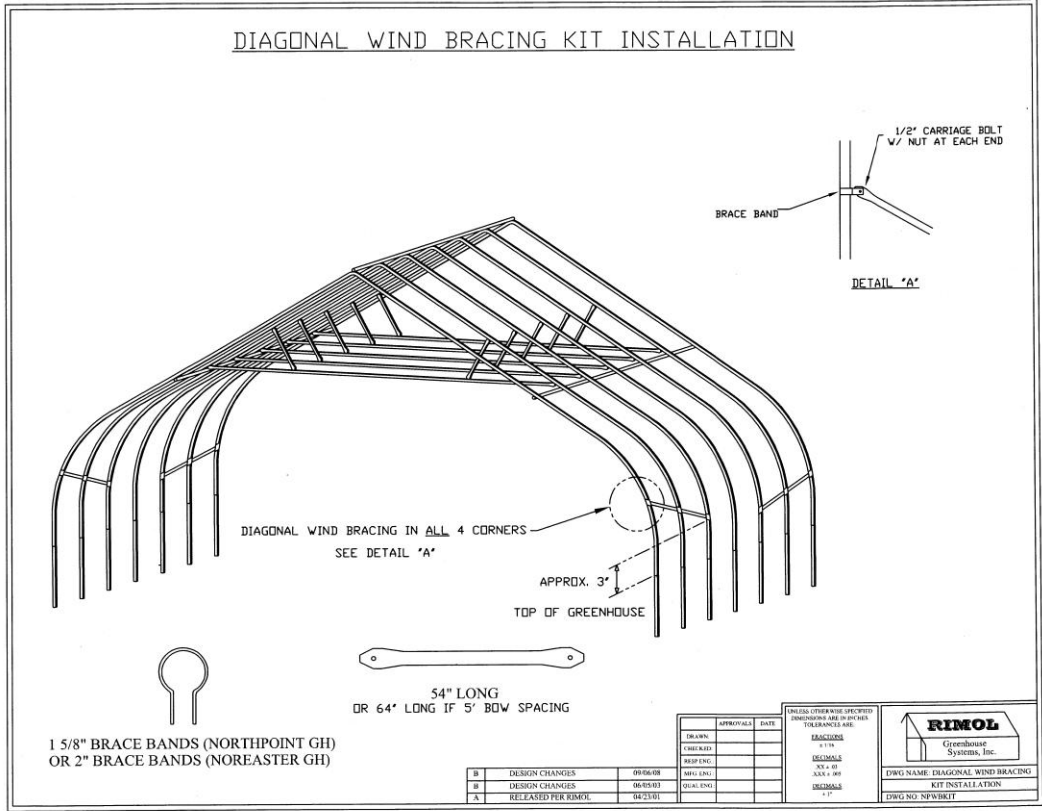


Baseboard installation



Baseboard splice

# DIAGONAL WIND BRACING KIT INSTALLATION



Revised 9-14-10