

5 Timber Frame Construction

The following is a list of safety situations likely to be found during the assembly of your Timber Frame system along with general safety recommendations regarding prevention.

Protecting Yourself and Those Around You

WARNING

- *Keep children and pets at a safe distance from the work area be certain they are under care of a responsible adult.*
- *Always wear appropriate protective clothing for the task when in the construction area.*
- *Follow manufacturers recommendations for the use of tools at all times.*
- *Do not attempt to assemble this unit without the assistance of another person.*

DANGER

- *Call 811 (Dig Safe) before attempting to dig for Micro Tube burial.*

5A: About The Timber Frame

The framing timbers supplied in the kit are pre-cut and notched to the required dimensions. Construction is primarily a matter of assembly and fastening.

Before starting, it is best to familiarize yourself with the various parts and where they are used. The instructions will make reference to these names and their relative part numbers. Please review the drawing below.

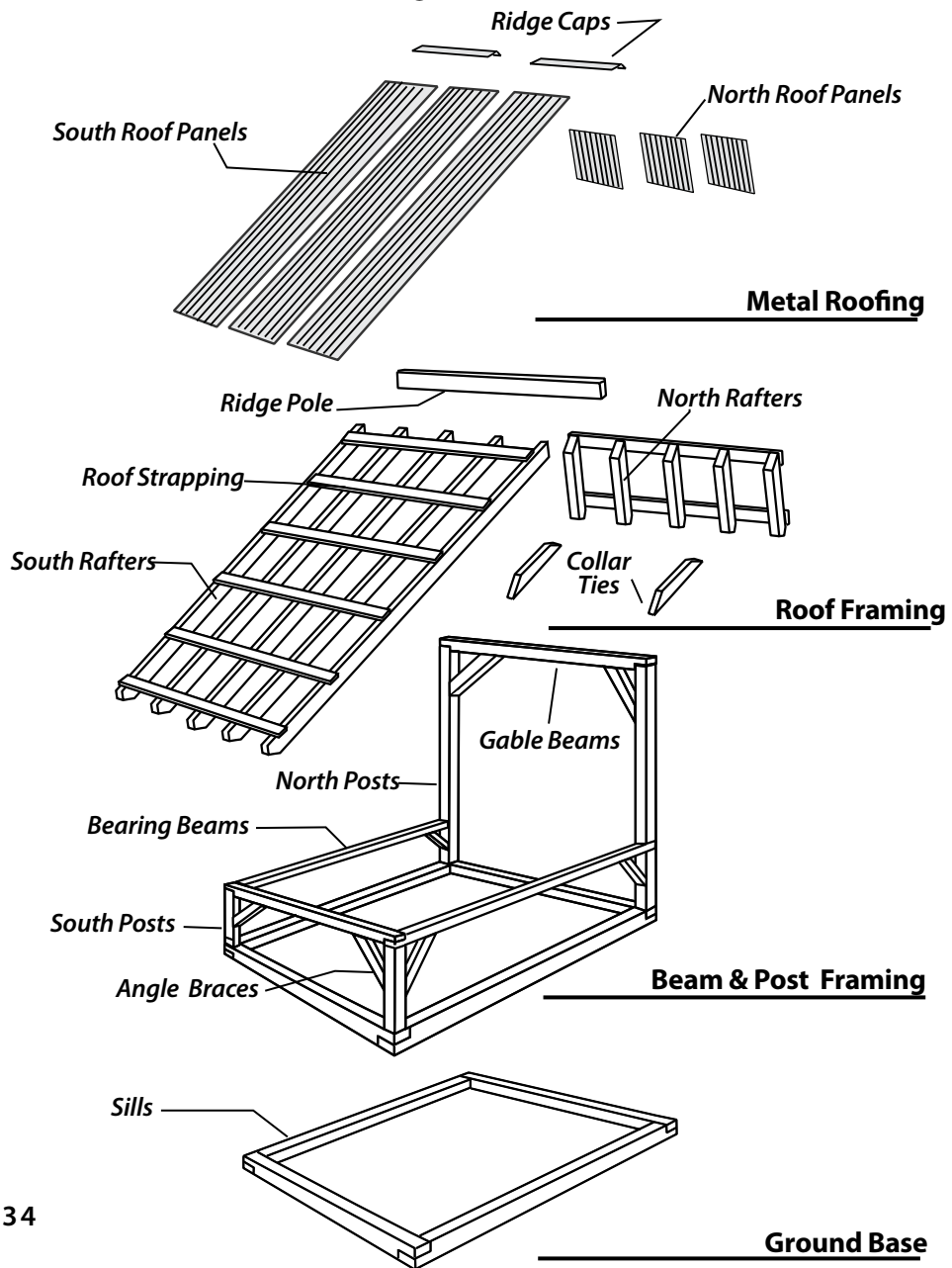
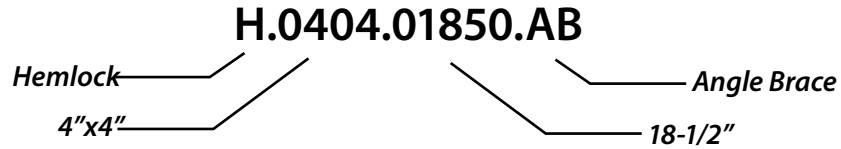


FIGURE 34

5B: Checking The Parts

- Each part is labeled with a Part Number made up of letters and numerals that identify the part. A typical Part Number is shown below:



- We recommend taking a complete inventory of parts received using your Parts List before starting construction.
If you have questions, or there if there are parts missing, please call our Solar Specialists at:

1-800-641-3436

5C: Orientation

- In addition to referencing part numbers, the instructions will refer to locations based upon compass orientation.

Your preliminary site assessment will have indicated the proper compass orientation for maximum Solar Collector exposure. If you have not had an assessment, please visit our web site.

Generally, the orientation will be within 45° either side of due South.

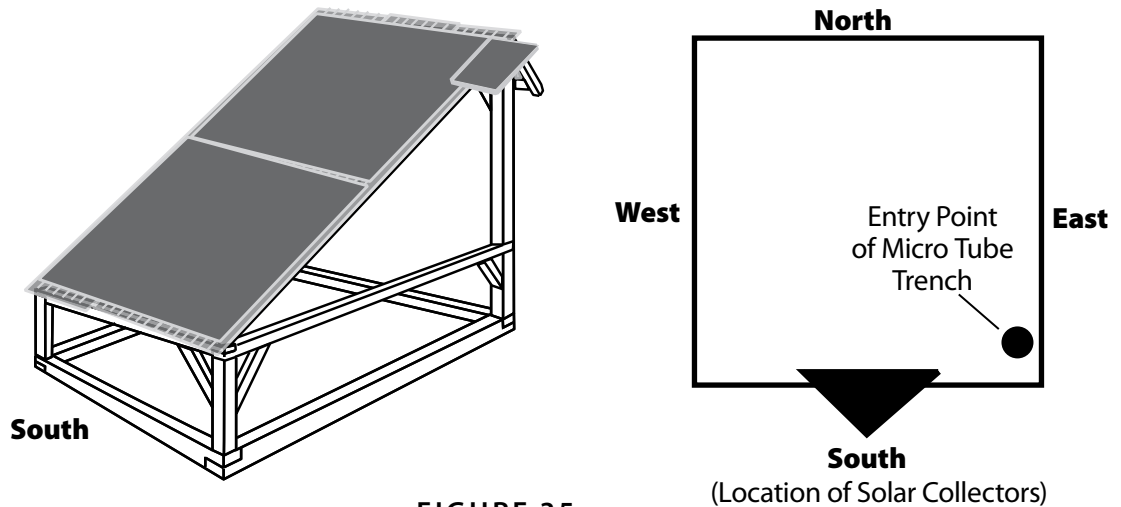


FIGURE 35

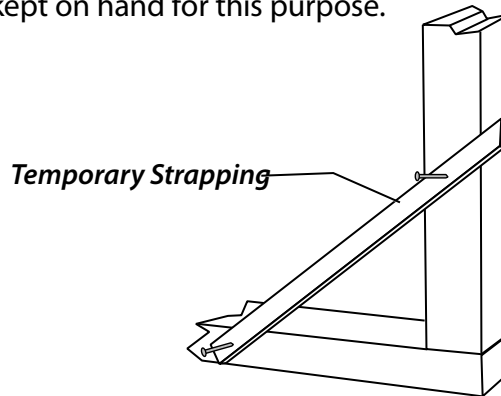
5D: Helpful Hints

- Assembly of the frame is simple, however, because of the size, the handling and positioning of the timber components can be difficult for one person.

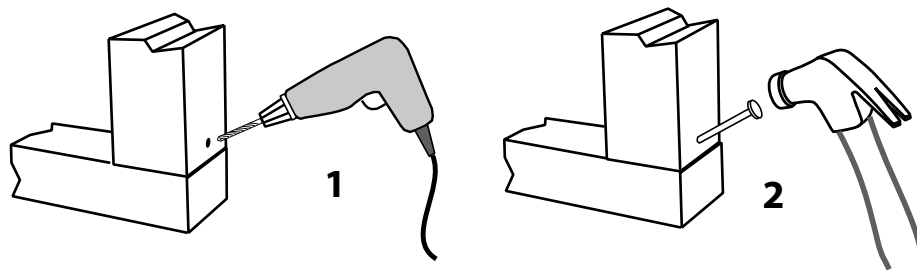
CAUTION

To avoid unsafe situations, we strongly recommend that two people assemble the Timber Frame.

- Maintaining alignment during assembly is best accomplished by using scrap lumber as temporary strapping until alignment is complete and permanent fastening has been accomplished. Sufficient strapping for this purpose ***is not supplied***. We recommend a supply of approximately 1"x3" scrap lumber in lengths of 3' to 6' be kept on hand for this purpose.



- Many of the joints call for “**toe-nailing**”. This term is used when the nail is driven into the joint at an angle. When using this method of fastening near the end of a timber. To prevent splitting of the wood near the edges, it is best to pre-drill a small diameter pilot hole partially through for the nail to follow.



- Four Cement Blocks are required for use under the Sill Timbers. ***These are not included in the parts supplied*** but are readily available at your local lumber yard or hardware store. Common sizes for the solid blocks are 8" wide x 16" in length. Thickness ranges from 2" to 4".

5E: Tools Required

 WARNING

*The Metal Roofing Material is sharp and should be handled with care.
Wear protective clothing including long pants and work gloves when installing the roof material.*

 WARNING

Always wear protective safety glasses during construction times.

The basic tools listed below should be available when constructing the Timber Frame.

- Electric Drill
- Tape Measure
- Utility Knife
- Protective Safety Glasses
- Hard Hat
- Level
- Step Ladder
- Square
- Hammer
- Adjustable Ratchet Strap

5F: Site Preparation

Parts Required

T.0406.09600.S1 Sill -(QTY 2)

T.0406.09600.S2 Sill -(QTY 2)

1. Following the orientation guidelines determined in your Site Assessment, level an eight foot square. Compact the soil firmly in the corner areas.

Place a Cement Block at each corner with similar orientation for each. Check the alignment by measuring the distances from corner to corner on the perimeter and diagonally from one corner to the other. The diagonal distances should be equal to insure the blocks are square.

2. Lay a Sill Timber from block to block and check that they are at equal grade using a level.

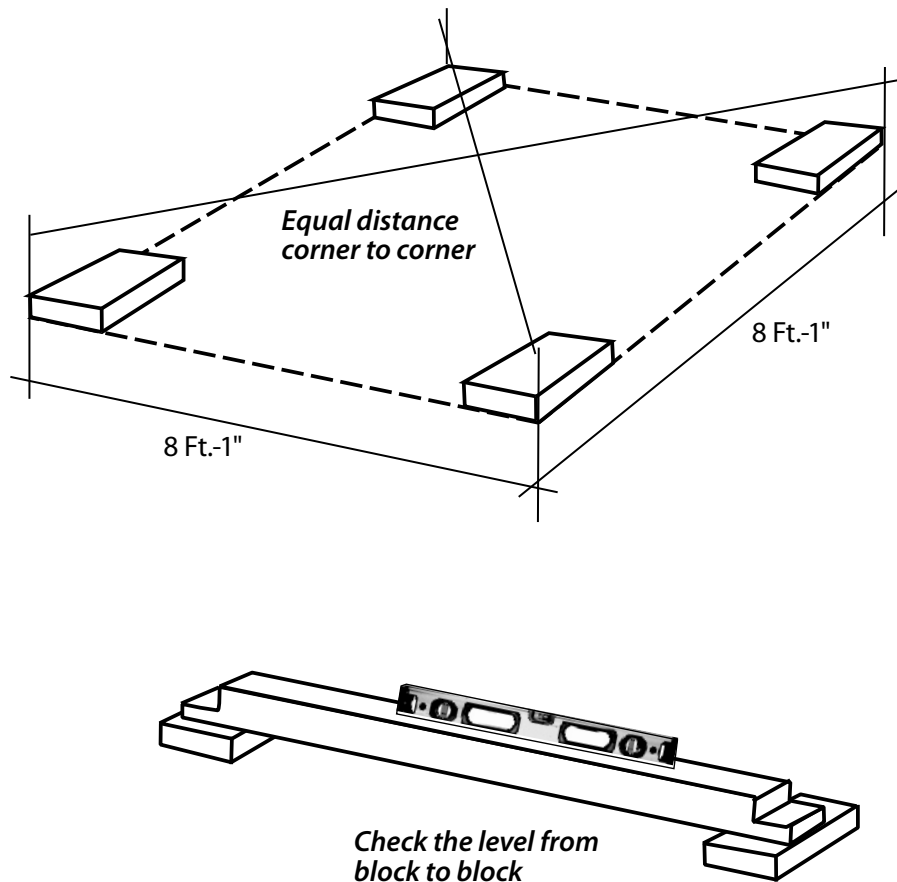


FIGURE 36

5G: Sills & Ground Anchors

Parts Required:

74151 Ground Anchor Kit



Wear protective eye, hand and head gear for these procedures

1. On the East & West sides of the site, place the S2 Sills on the Cement Blocks with the pre-drilled holes facing upward. Align the ends of the Sills with the two Blocks.

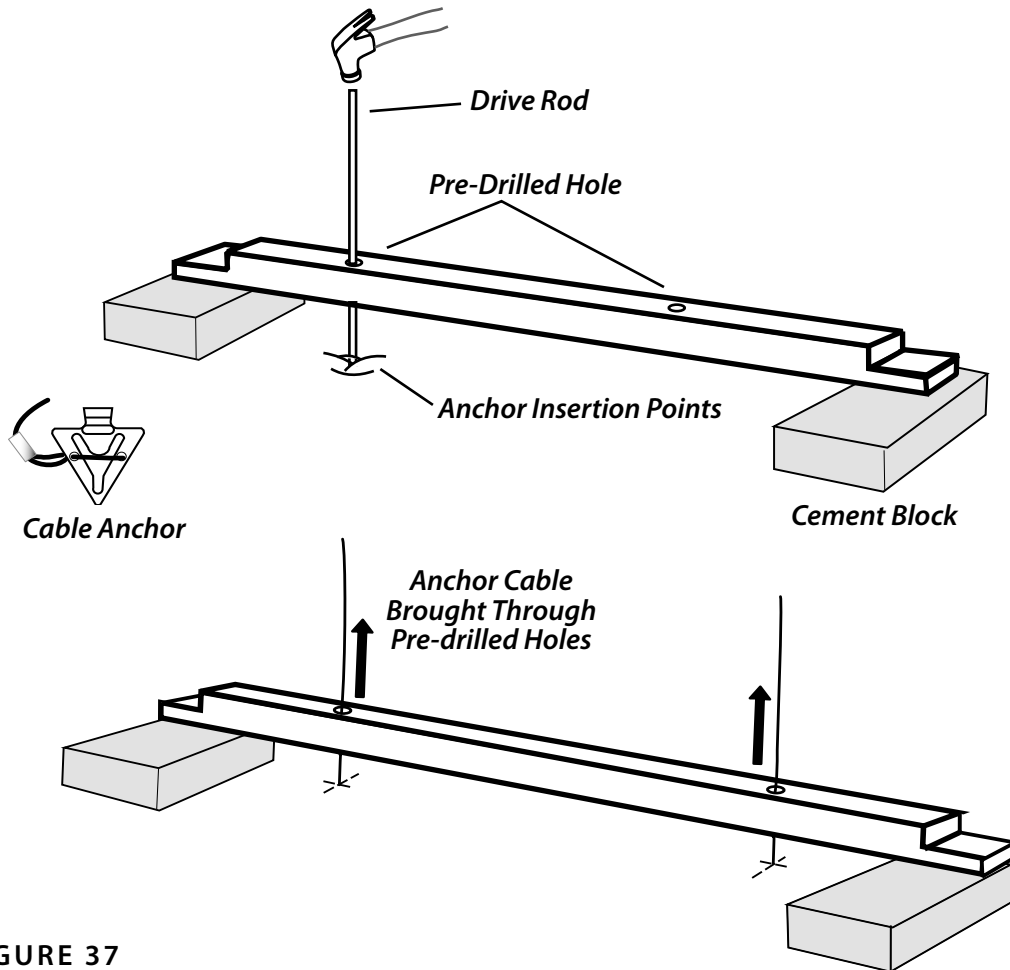


FIGURE 37

2. Place all four Sills on the Concrete Blocks. Align them at the corners using a square and place a single nail in the center of **all four** of the corner joints. Drive the each nail in until the head is flush.
3. Measure across opposing corners and adjust until all are equal. Using scrapwood, apply temporary braces at opposite corners to maintain alignment. Complete the corner nailing using three (3) additional nails in each corner.
4. insert the Drive Rod through the pre-drilled hole in the Sill and into a Cable Anchor as illustrated in Figure 38. Drive the Cable Anchor at least 18" into the soil. Be sure to leave at least 30" of Cable above the Sill.

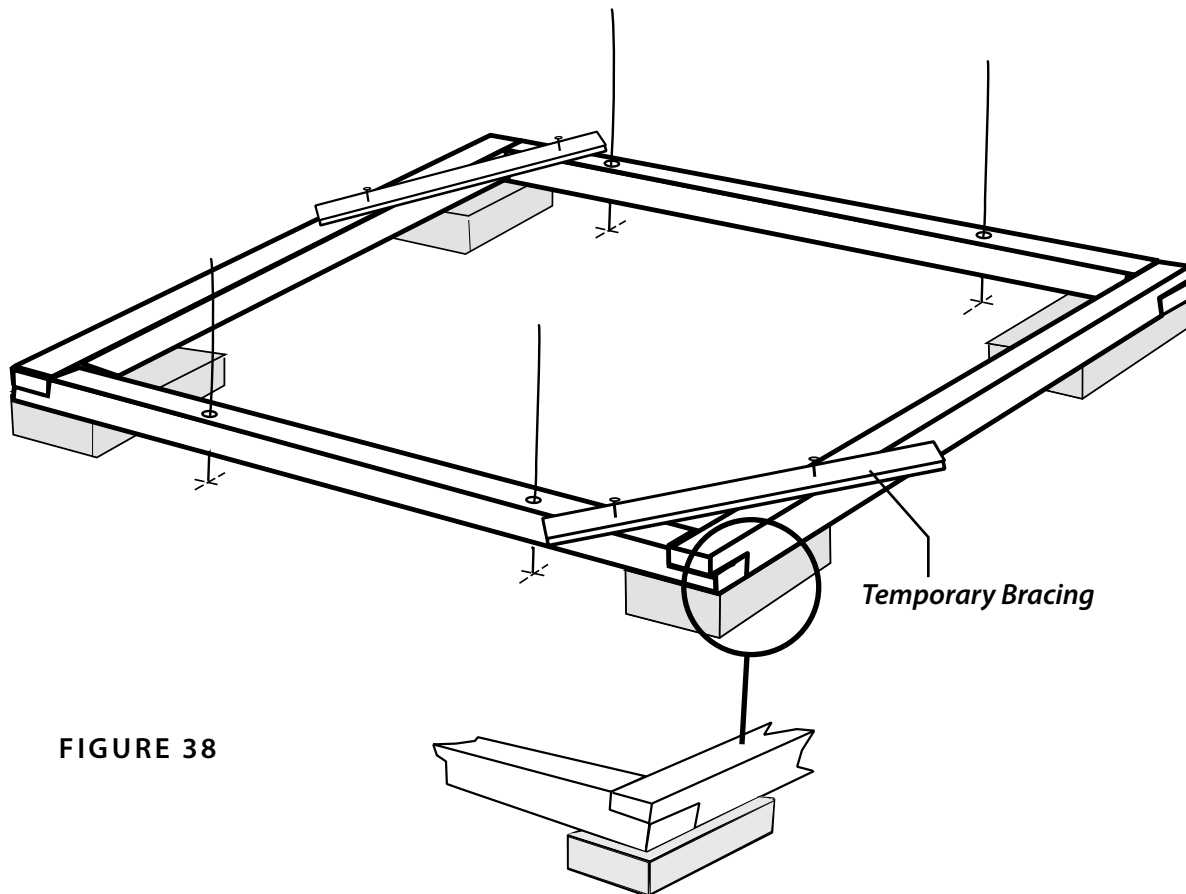


FIGURE 38

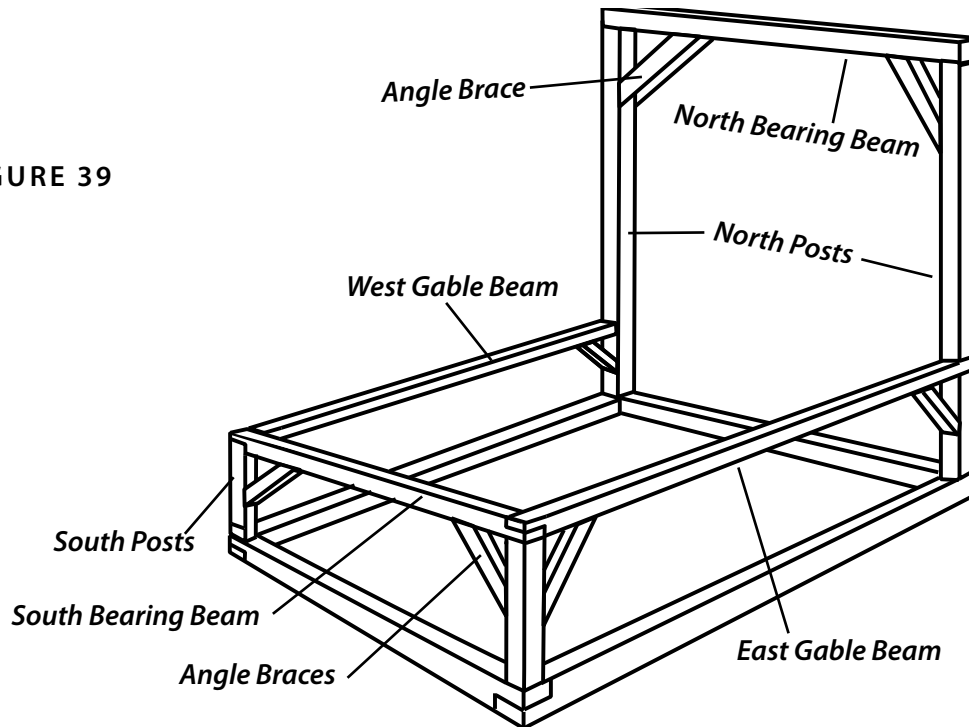
NOTE: The Timber Sills should not extend beyond the Cement Blocks.

5H: Posts, Bearing Beams & Angle Braces

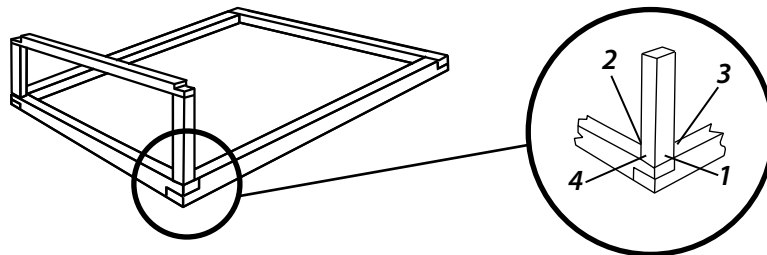
Parts Required:

H0404.02000.WP. (QTY) 2 SOUTH POSTS	H0404.09600.B1 (QTY) 1 NORTH BEARING BEAM	H0404.09600 B2 (QTY)1 SOUTH BEARING BEAM
H0404.01800.AB. (QTY) 6 ANGLE BRACES	H0404.07600.WP (QTY) 2 NORTH POSTS	
H0404.03000.AB (QTY) .2 NORTH ANGLE BRACES	H0404.09600.G1 (QTY) 1 EAST GABLE BEAM	H0404.09600.G2 (QTY) 1 WEST GABLE BEAM

FIGURE 39



1. Place and align the South Posts on the Sill corners flush to the outside of the Sills and Toe Nail each in place using an opposite side nailing sequence as shown, to maintain alignment.
2. Place a Bearing Beam on the Posts with the Rafter Marking facing up. Align as required and fasten the Beam ends to the Post using three nails in each notched end.



3. Install the two North Posts at the corners with the notches towards the bottom and facing outward. Be certain that the Posts are flush to the outside of the Sills. Align and secure each post with temporary Scrap Ties placed beneath the notches and Toe Nail as in Step 1.
4. Install Gable Beams between the North and South Posts. Align the Beams for proper notch orientation. The pre-drilled Ground Cable Holes should be in the vertical position.

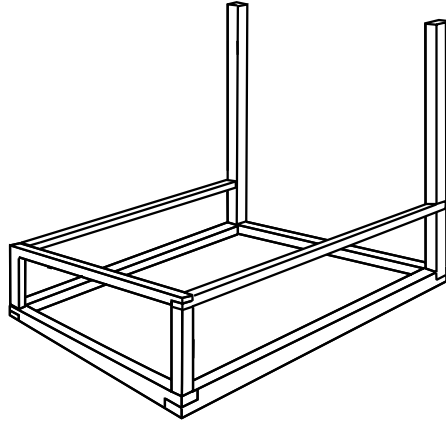


FIGURE 40

5. With help from an assistant, install the second Bearing Beam on top of the North Posts. Toe Nail in place using four nails on each end.
6. It is important to make certain the assembly is aligned and plumb in all directions. Using a level, bring all elements into plumb and hold them in place with temporary Scrap Ties while nailing.
7. Pre-drill all Angle Braces for Toe Nailing on three sides. Starting with the Front Angle Braces install the Braces as shown keeping them flush to the outside surface of the Bearing Beams & Posts.

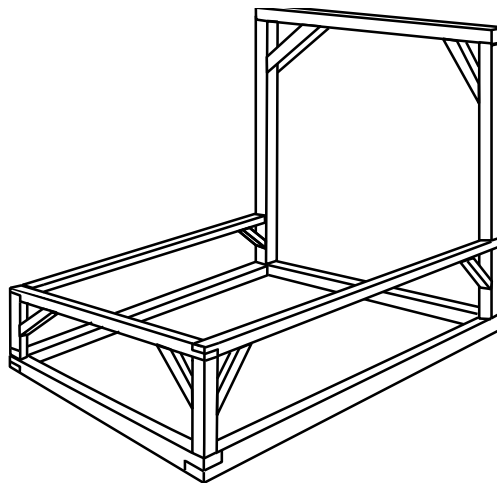


FIGURE 41

5I : Rafters, Ridge Pole & Roof Strapping

Parts Required:

H0304.09278.RA. (QTY) 5
SOUTH RAFTERS

H0104.09600.RS (QTY) 8
ROOF STRAPPING

H0304.03118.RA. (QTY) 5
NORTH RAFTERS

H0106.09600.RP (QTY) 1
RIDGE POLE

WARNING

Wear eye protection and head protection at all times. Two people are needed to safely assemble this kit. When using a ladder, be certain the ladder is level and on a solid base before use.

CAUTION

The timber is rough sawn. Always wear hand protection when handling

1. Install one North Rafter on each end of the North Bearing Beam with the bottom bevel on the Beam and the end of the Rafter flush with the outside edge of the Beam. Toe Nail securely with two nails.
2. Repeat Step 1 for the two outside South Rafters and align them with the installed North Rafters.
3. With the help of another person, install the Ridge Pole with the end flush with the outside and top surfaces of the Rafters. Secure both Rafters to the Ridge Pole Repeat for the opposite end.

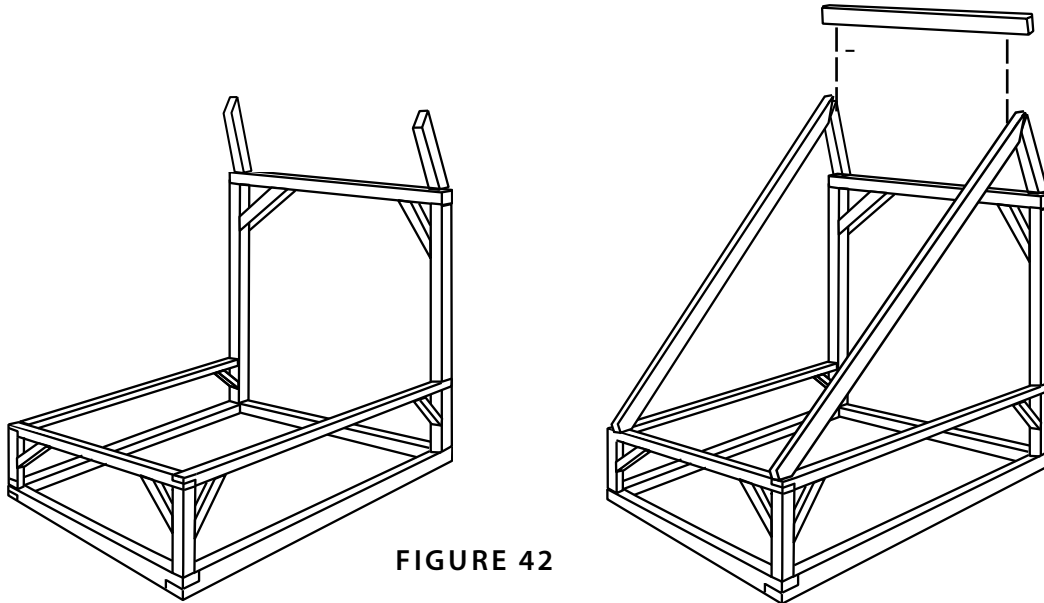


FIGURE 42

5l: Continued

4. Install a North Rafter in the center and secure it to the Bearing Beam and Ridge Pole.
5. Install the center South Rafter as above.
6. Following the markings on the Bearing Beams, install the remaining Rafters as in Step 4&5.
7. Measure from corner to corner and bring the assembly into alignment.

TIP: The Ratchet Strap can be helpful in moving the Rafter assembly into alignment.

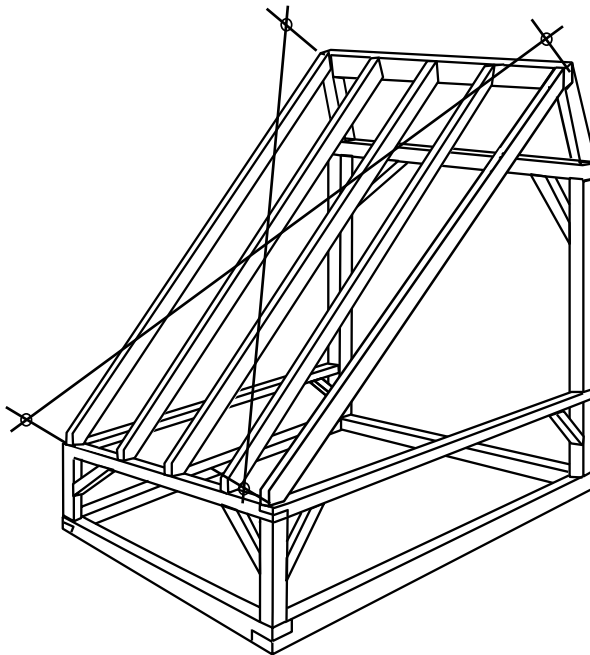
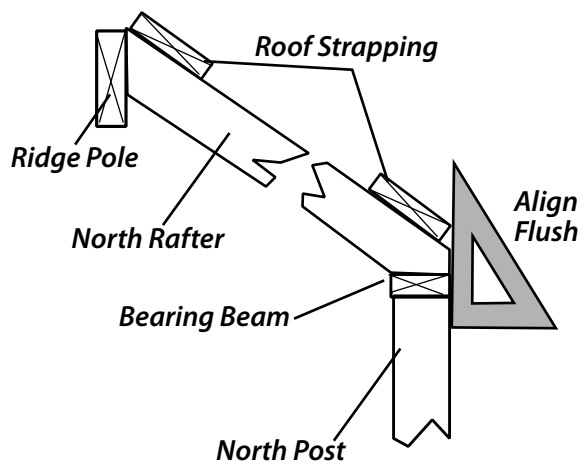
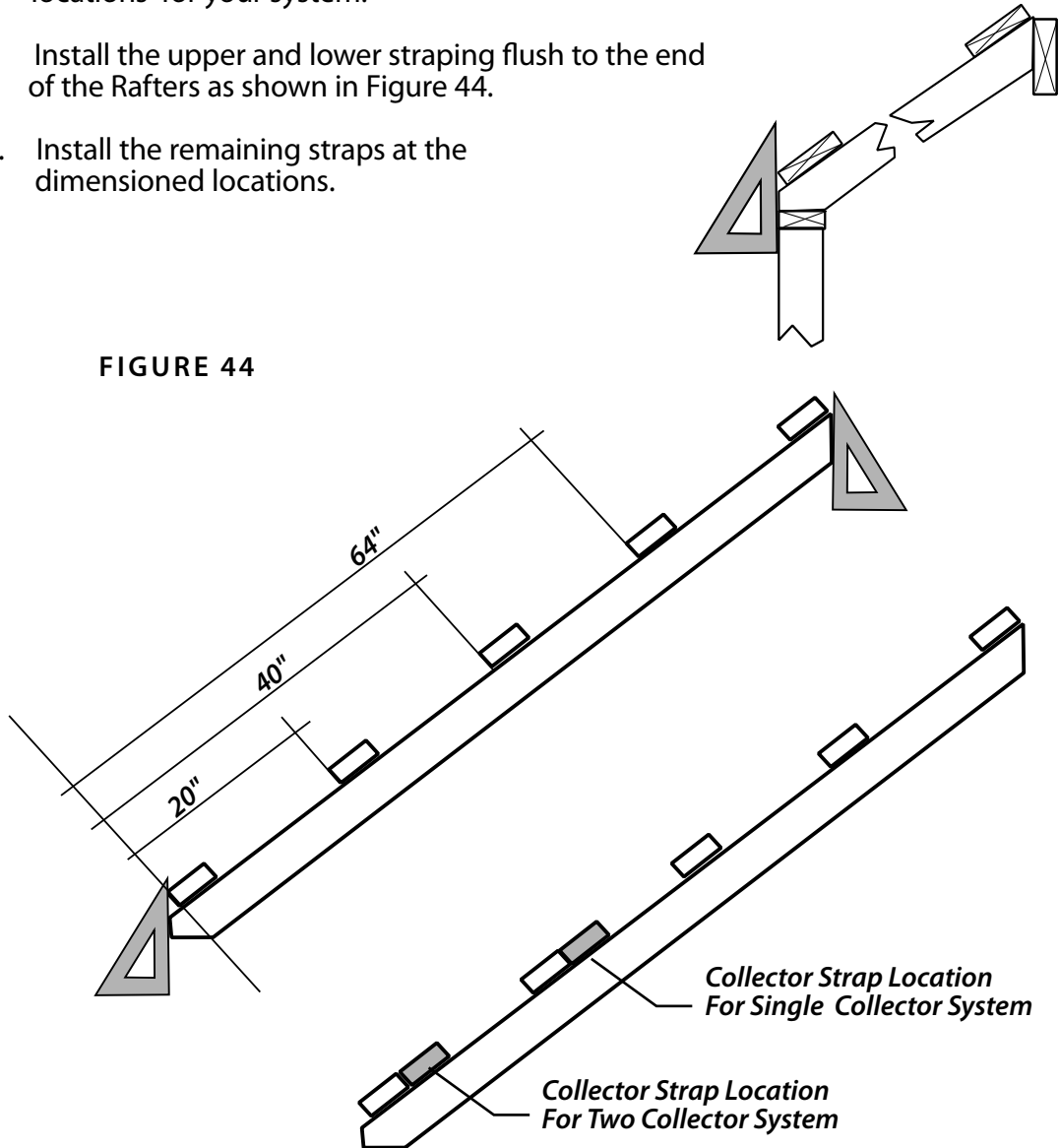


FIGURE 43



5H: Continued

- The location of the Roof Strapping on the South Rafters is critical to the proper mounting of the Solar Collectors. Single and double Collector installations differ in Strap spacing. Please study the illustration below to determine the strapping locations for your system.
- Install the upper and lower strapping flush to the end of the Rafters as shown in Figure 44.
- Install the remaining straps at the dimensioned locations.



- The location of the final strap is determined by the number of Collectors to be mounted.

NOTE: Follow the diagram for proper strap location

- Repeat Step 9 for the upper and lower Strapping on the North Rafters.

5J: Anchoring the Timber Frame

1. Insert the Quick Vise into the pre-drilled holes in the East and West Gable Beams and tap them into place with a hammer.
2. Feed the Anchor Cables through the bottom of each Quick Vise and pull them up tight with Pliers.

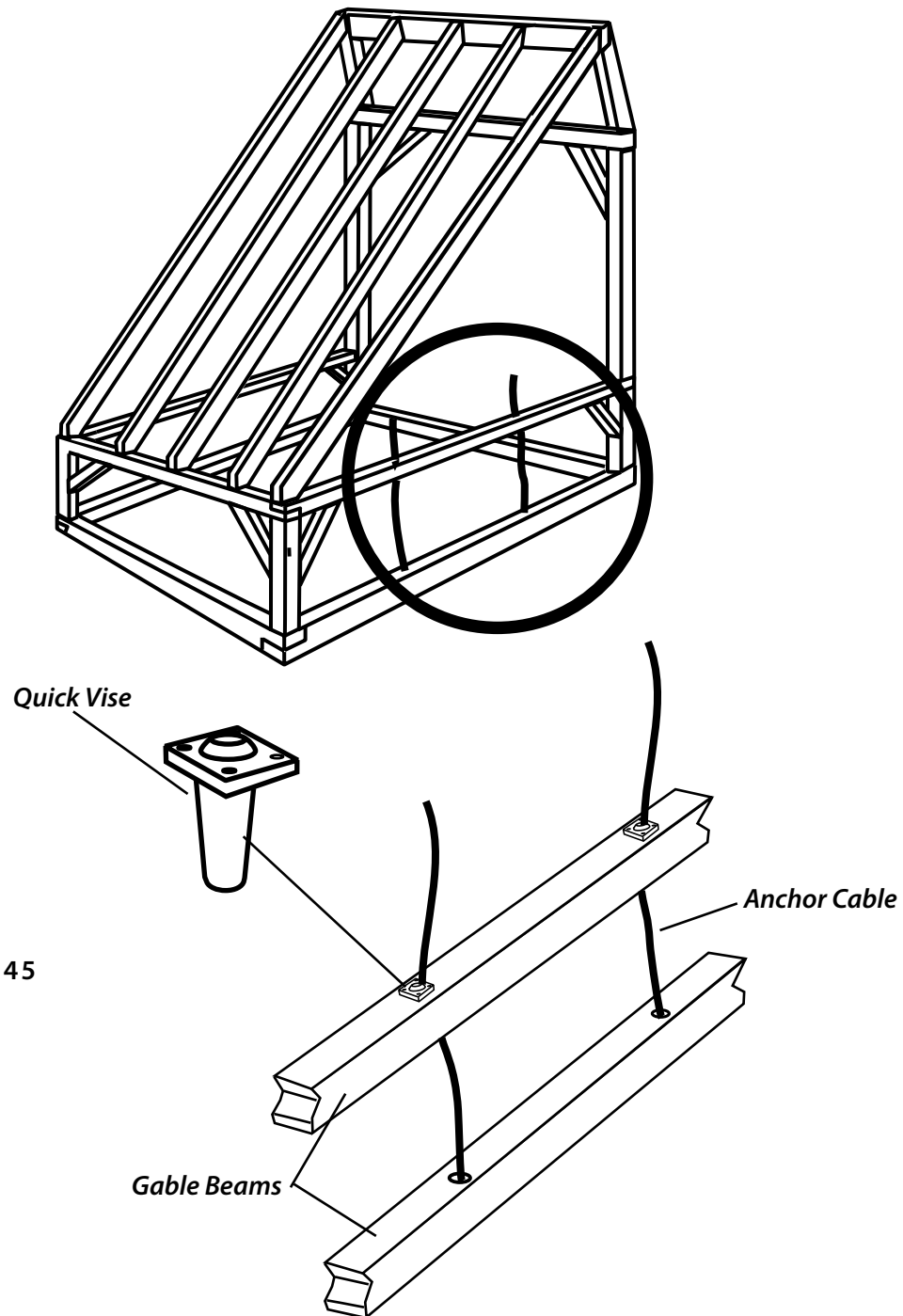


FIGURE 45

5K: Placing & Fastening The Roof Panels

! WARNING

The metal roofing material has very sharp edges. Extreme care and protective gloves should be used when handling this material. Two people are required to safely implement this assembly.

! WARNING

Always be certain the ladder is level and on a solid base before use in this procedure.

TIP: If you are Left Handed, it is best to install from left to right. If you are Right Handed, start from the right.

TIP: Pre-taping the roofing screws into the roofing with a hammer will make drilling faster.

TIP: Do not over-tighten the screws. This can cause panel mis-alignment.

TIP: Roofing can be manipulated to regain alignment.

1. There are two lengths of Roof Panels. The long panels are for the South Roof and short panels are for the North Roof.
2. The ends of the panels differ. Each has a finished cut on one end and a rough cut on the other. The rough edge should always be placed at the top flush with the edge of the upper Roof Strap.

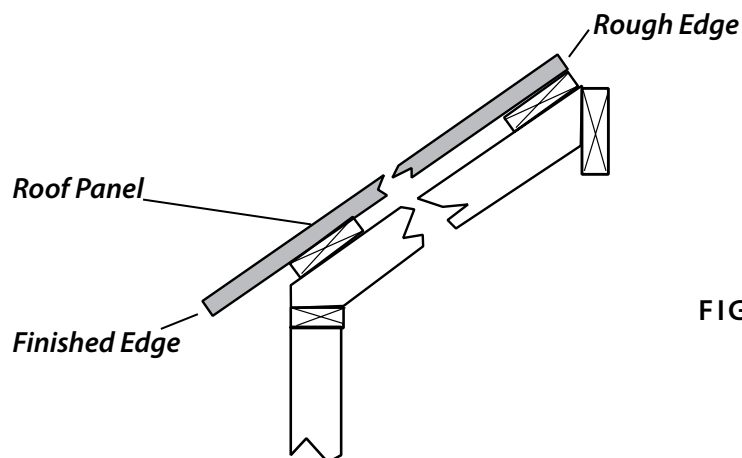
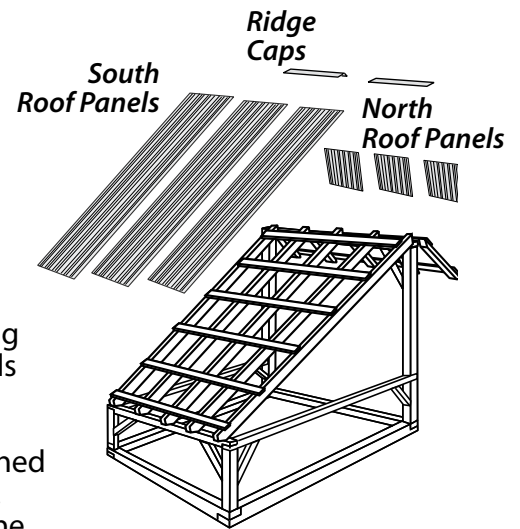


FIGURE 46

5K: Continued

3. Working from one end to the other as noted above, place the first sheet on the Roof. Measure and align it so that it has a 2-1/2" overhang beyond the outer Rafter at the top and bottom.

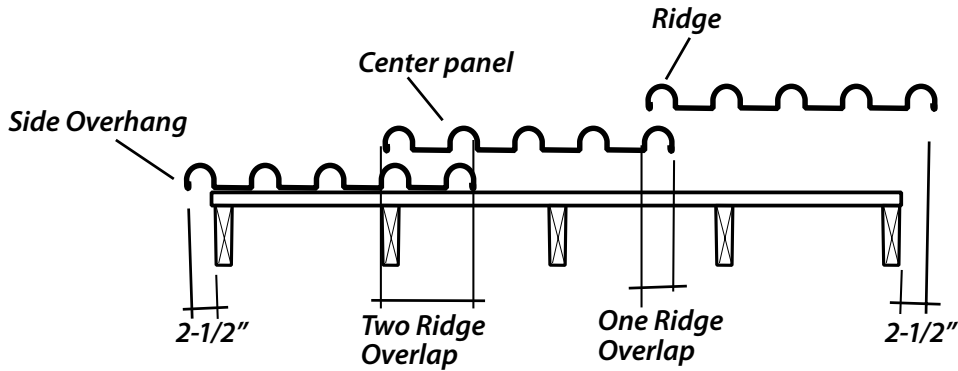


FIGURE 47

4. With someone holding the panel in place, fasten the panel through the second Ridge from the outside and into the *center of each Roof Strap* using the supplied Roofing Screws. Tighten until snug.

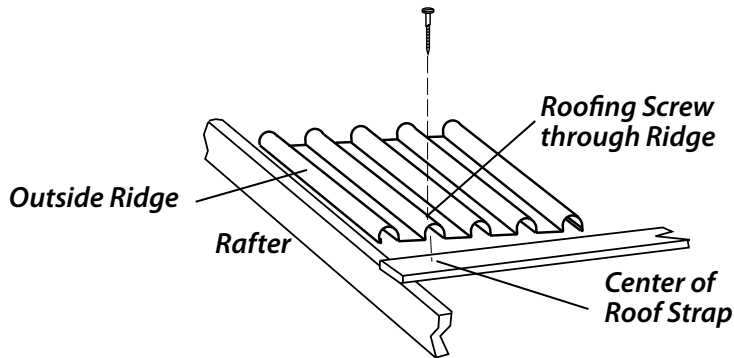


FIGURE 48

NOTE: Do not place screws in the top Strap at this time. This will be done when the Ridge Cap is installed.

5. Fasten the Roofing Panel to the Strapping through the next Ridge.
6. Place the second Roofing Panel so it overlaps the first Panel by two Ridges.
7. Check for alignment by measuring the distance from the edge of the Roofing at the top and bottom to a Rafter.

5K: Continued

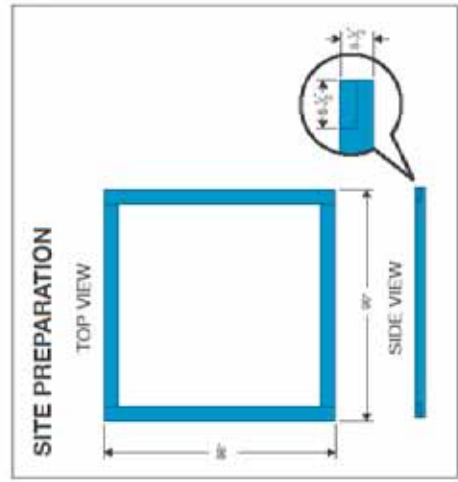
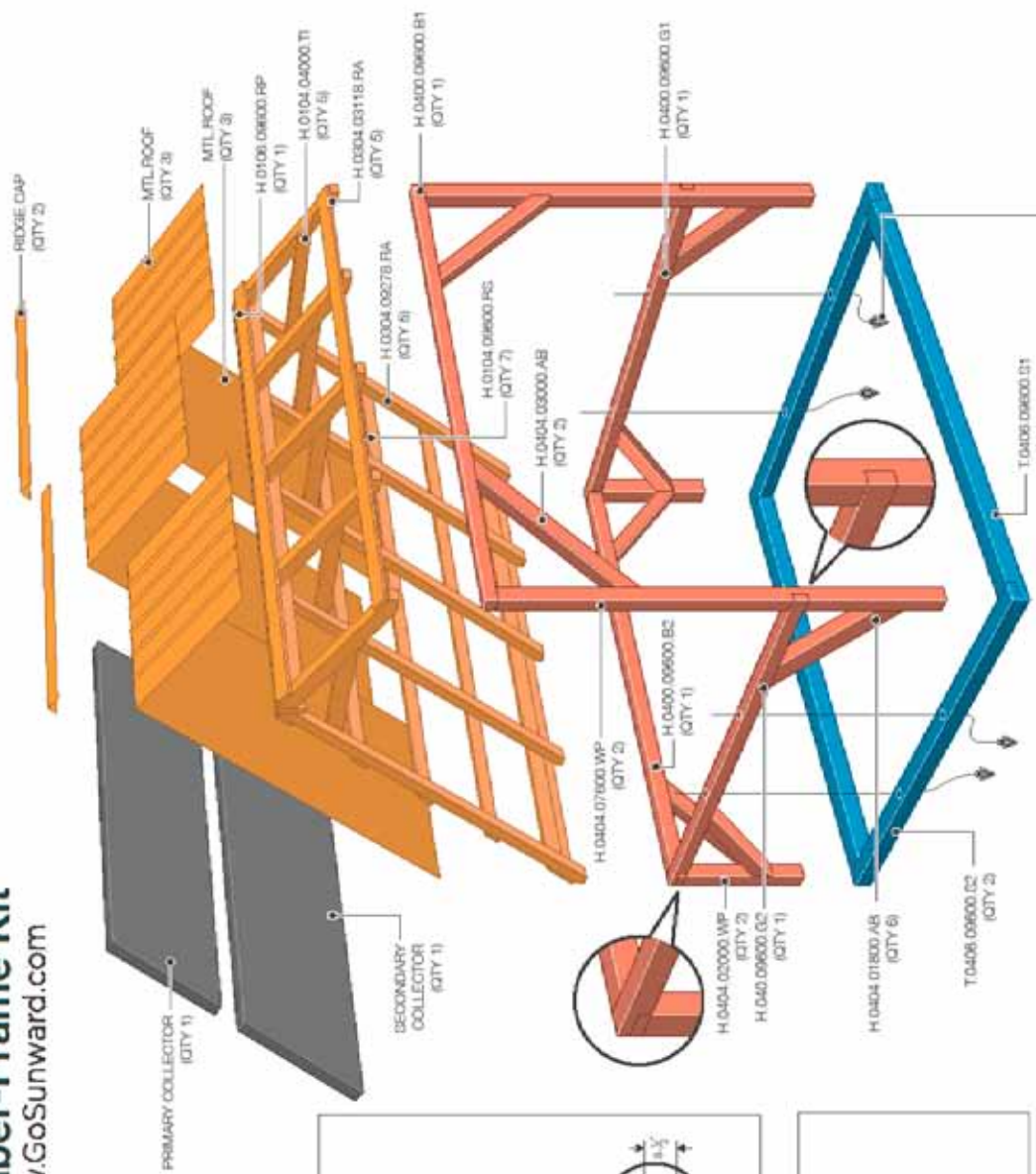
8. Working in the same direction, secure the second Panel to the Straps through all Ridges except the last.
9. Place the third Roofing Panel with one Ridge overlapping the second Panel. The Panel should overhang the outside Rafter by approximately 2-1/2". Check the alignment and secure all Ridges.

TIP: To allow for easy access to the Upper Collector during Collector installation, it is best to install the North Roof after the Collectors are in place.

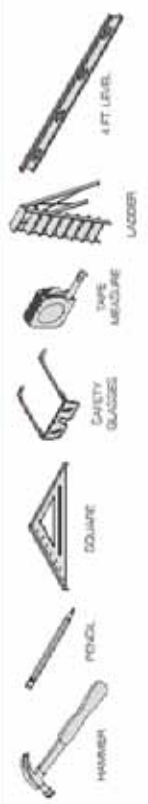
10. Repeat steps 1-9 to install the North Roof after the Collector(s) have been installed.

5L: The Timber Frame Kit

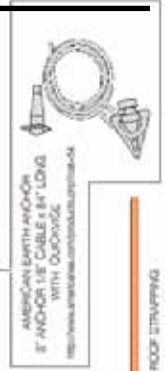
Timber-Frame Kit
www.GoSunward.com

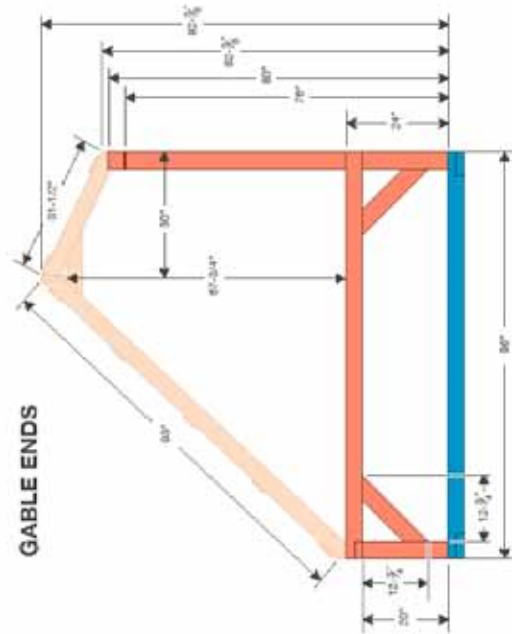
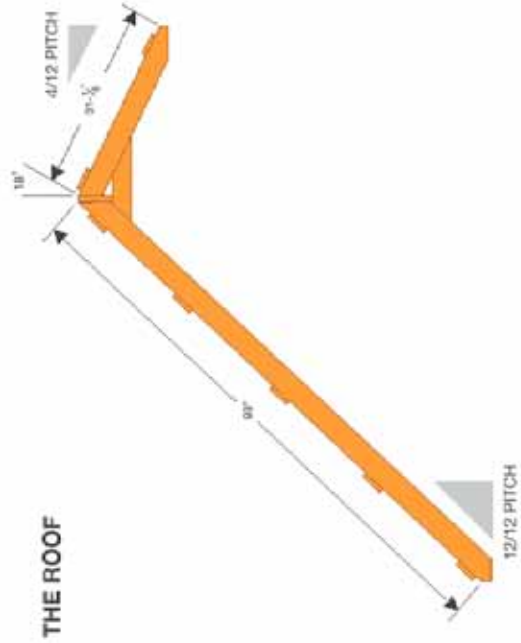
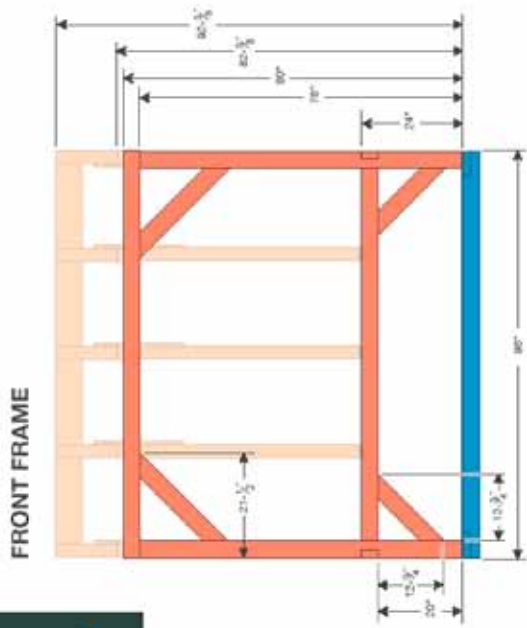
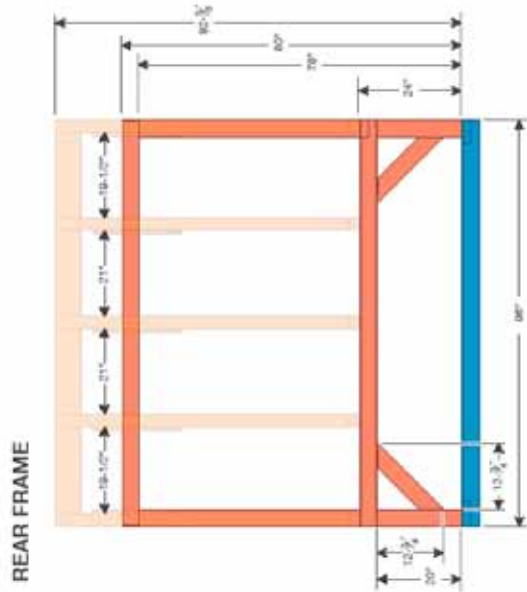


TOOLS



HARDWARE

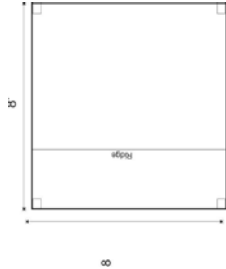




Design: 8x8 Timber-Frame

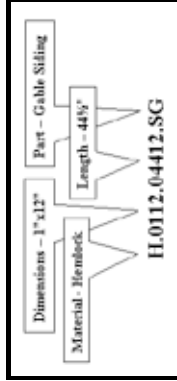
Client: Sunward

Roof Color: galvanized



Color Code
Floor
Wall / Framing
Roof
Bracing / Extra Lumber

Wall Height	80	24
Rafter Length	31 1/8"	92 7/8"
Roof Pitch	4/12	12/12
Pitch Angle	18	45
Cube Size	96"L x 40"W x 11"H	
Roofing	metal	



NOTE: Please look for the packing slip attached to your kit. The packing slip supplies notes and any substitutions that the cutters may have made.

Part Number	Init.	Part Description	Material	Qty.	Dim.	Length	Angle	Notes
FLOOR - Blue								
T.0406.09600.S1		Sills 1	Pressure treated	2	4x6	96	90	1/2 lap both ends
T.0406.09600.S2		Sills 2	Pressure treated	2	4x6	96	90	1/2 lap both ends - Drill 5/8" hole centered from each end @ 18"
WALLS - Red								
H.0404.09600.B1		Beam Bearing 1	Hemlock	1	4x4	96	90	Layout for 3" rafters, 24" on center
H.0404.09600.B2		Beam Bearing 2	Hemlock	1	4x4	96	90	1/2 lap both ends, Layout for 3" rafters, 24" on center
H.0404.07600.WP		Post Front	Hemlock	2	4x4	76	90	Mark Bottom, Notch 20" - 24" from bottom
H.0404.02000.WP		Post Rear	Hemlock	2	4x4	20	90	
H.0404.03000.AB		Angle Brace	Hemlock	2	4x4	30	45	
H.0404.01800.AB		Angle Brace	Hemlock	6	4x4	18	45	
H.0404.09600.G1		Beam Gable 1	Hemlock	1	4x4	96	90	Salt Box 1/2 lap, drill two 5/8" holes centered, 18" in from each end

Part Number	Init.	Part Description	Material	Qty.	Dim.	Length	Angle	Notes
H.0404.09600.G2		Beam Gable 2	Hemlock	1	4x4	96	90	Salt Box 1/2 lap, drill two 5/8" holes centered, 18" in from each end
ROOF - Orange								
H.0304.03118.RA		Rafter Front	Hemlock	5	3x4	31-1/8	18	Crown up, Long point to plumb cut measure top of rafter
H.0304.09278.RA		Rafter Rear	Hemlock	5	3x4	92-7/8	45	Crown up, Long point to plumb cut measure top of rafter
H.0106.09600.RP		Ridge Pole	Hemlock	1	1x6	96	90	Crown up, layout for 3" rafters, 24" on center all sides
H.0104.04000.TI		Collar Tie	Hemlock	5	1x4	40	45/72	Long point to long point
H.0104.09600.RS		Roof Strapping	Hemlock	8	1x4	96	90	May be pieced 24 on center

Part Number	Init.	Part Description	Qty.	Length	Notes
Hardware					
FN.16D.GALV		16d Galv Nails	3 lbs	3-1/2	Supplied by Sunward
FN.8D.GALV		8d Galv Nails	1	2	Supplied by Sunward
PLANS		Assembly Instructions	1	1	Supplied by Sunward
ANCHOR.GRD		Ground Anchor	4	12	Supplied by Sunward
RFNG.SCR		Roofing Screws	100	1-1/2	Match to roof color
Roofing					
MTL.ROOF		Metal Roof	3	99	
MTL.ROOF		Metal Roof	3	35	
RIDGE.CAP		Ridge Cap	2	60	*** Special 8" ridge cap ***