

## Building 7 Modified Warre' Bee Hives



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These plans are based on the hive design developed by Abbe Emile Warre as described in the 12<sup>th</sup> Edition of Beekeeping for All published in 1948. We obtained the description from

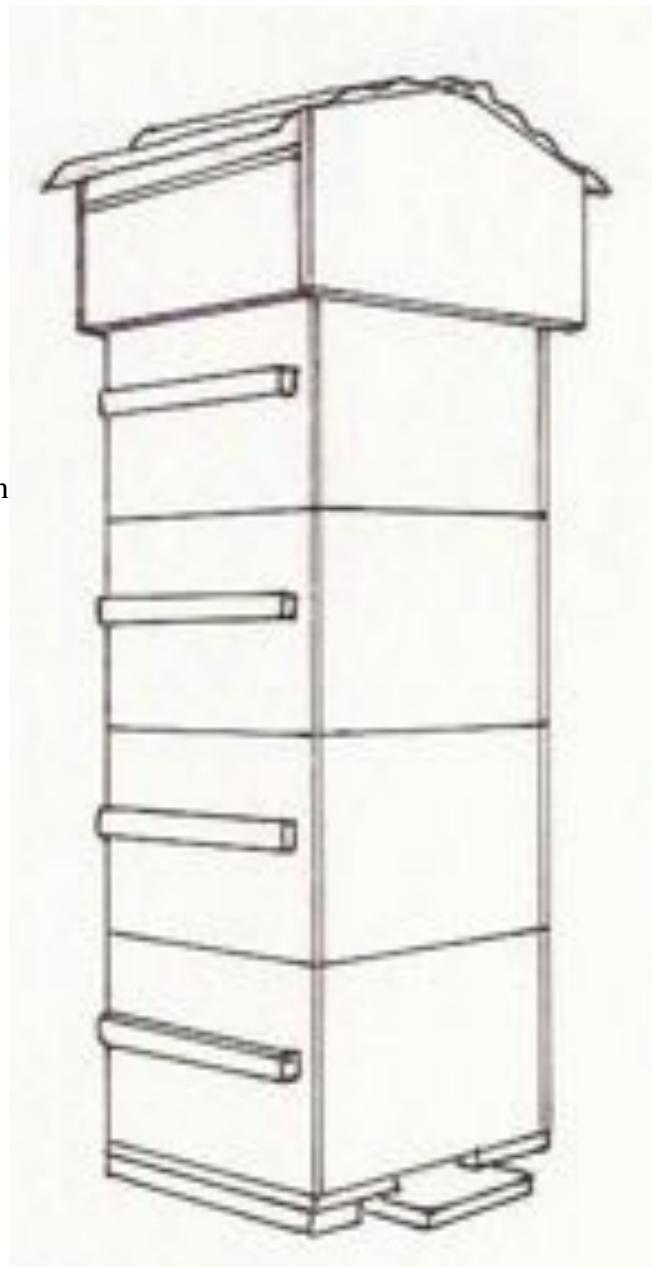
<http://www.microecofarming.com/html/natural-beekeeping/natural-beekeeping-warre-hive.htm>

We have revised the dimensions to accommodate English measures (US customary units), to use a rabbet joint with glue and screws for greater strength and to more efficiently use plywood as the building material.

Honey Bees improve the habitat for humans and other living things by increasing pollination. Providing a home for honey bees and maintaining a habitat free of poisons increases the quality of life for all of us and provides honey as a source of nutrition.

These plans are offered as our best effort to make bees hives convenient and inexpensive. When produced according to these plans with the cost of materials at Denver, Colorado in 2011, these hives contain about \$47.00 in materials each.

You are authorized to duplicate and distribute these plans. We only ask that, if you figure out how to make them better or stronger, you share that information with us so we can share it with the world.



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I resized the basic Warre hive box to an inside measure of 12" X 12" X 9" (compared to 300mm X 300mm X 210mm in the metric measurements). That makes it a little more than a  $\frac{1}{2}$  inch bigger in length and width and about 3/4" inch taller.

That simplifies taking the measurements and uses a 4X8 sheet of plywood more efficiently. However, the components you build with these measurements will not be interchangeable with Warre hive components built with other plans. We also changed the roof design to use a polycarbonate roofing material.

These plans will build 7 complete hives including for each hive:

1 roof



1 quilt



4 boxes



1 floor



The hive will need to be raised at least 4" inches above the ground. The floor can be set on any kind of a stand. Because of the landing board, the floor will not sit flat without additional pieces. For the prototype pictured, we cut four 6" lengths off of an old 4"X4" post and screwed through the floor into the post sections and then set the whole hive on concrete pavers.

The floor is 1/8" smaller than the boxes to prevent rain from pooling at the edge of the floor and entering the hive.



There is a 15" square cover of duck cloth that goes between the quilt and the top box.



The quilt is 4" deep with a duck cloth bottom. It holds an organic insulation material (straw, leaves, wood shavings, etc.) that is kept dry by the roof to insulate the hive and absorb moisture.



The roof is 2" bigger than the quilt to provide an air space all the way around the side wall of the quilt and the top 1" of the top box. The roof is vented to prevent over heating from the sun.

The original Warre design does not call for making frames. The bees will build comb on the bars without the frames but they will also attach the comb to the side walls. That is fine if all you want to do is harvest a Box of honey once a year. However, if you want to manage your bees more actively, then removal and inspection of the comb is necessary and the Frames will facilitate that process.

## Tools

In order to make building efficient we recommend the following tools:

Table saw with adjustable fence and guide to do most of your cutting



Router table with 3/4" bit set to 3/8" depth (check your materials.  
The rabbet should be the full thickness of the side board cut 1/2 way  
into the end boards.)

Drill with a 3/32 bit to predrill the screw holes

Drill with a driver that matches your screws

Circular Saw

Belt Sander

Hammer

Driver to match roofing screws

Staple Gun



## Materials

5 – 4' X 8' X 3/4" exterior grade plywood (sheeting)

8 – 1" X 8" X 8' plus 24" common pine board (or equivalent)

2 – 26" X 8' sheets polycarbonate roofing material

1 – 4' X 8' X 3/8" exterior grade plywood (we used 1/4")

2 yards duck cloth (72" X 60")

2 - 5 piece packs roofing mold strips (7 strips needed)

2 - 50 piece packs roofing screws (56 +/- needed)

16 oz Water Proof Wood Glue

2 - 1 lb - #8 - 1 1/4" Deck Screws (342 +/- needed)

2 - 1 lb 1 1/2" Finish Nails (448 +/- needed)

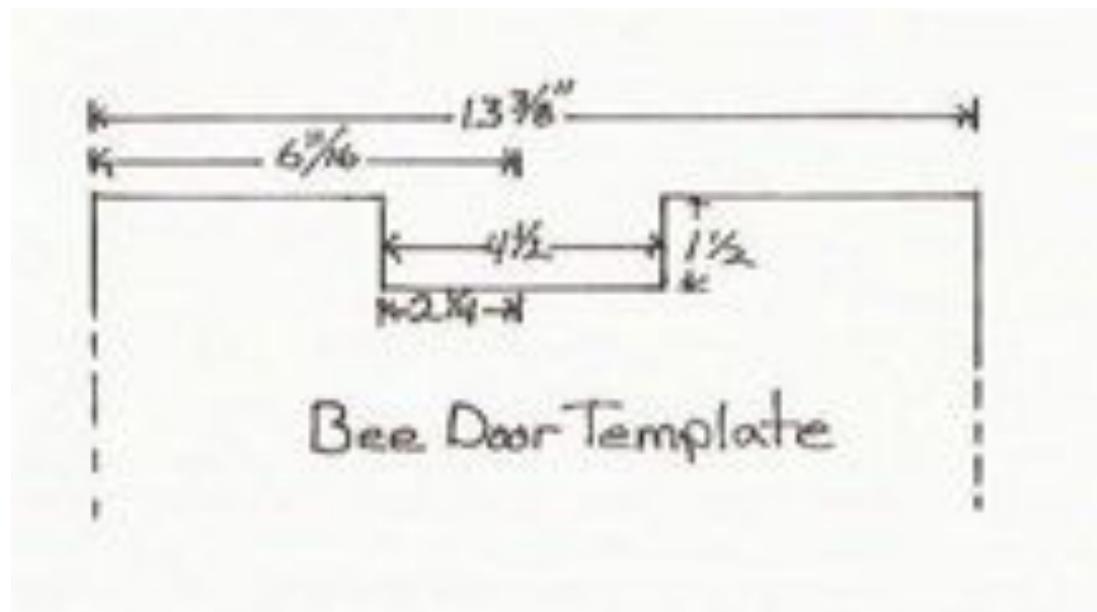
2 - 6 oz 1" Brads (448 +/- needed)

Box Staples

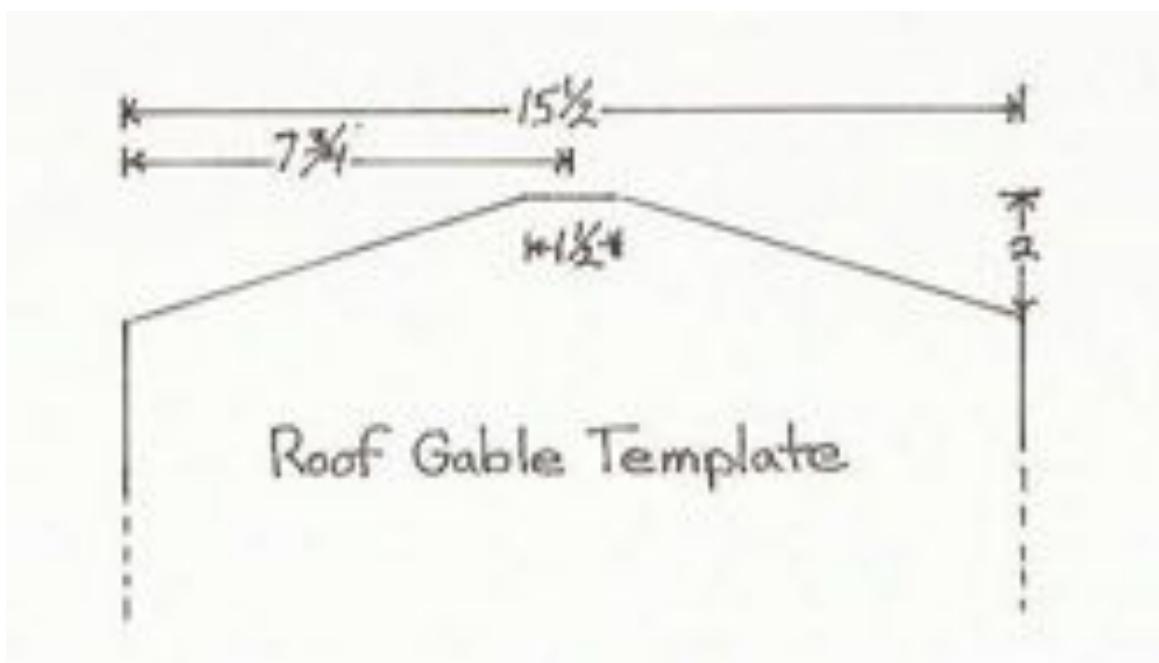
## Templates

Make templates out of cardboard to mark the cuts for the bee door in the floor and for the gable on the roof. The dimension of the dotted lines does not matter.

The bee door is a cut out of the Floor 4 1/2" long and 1 1/2" deep centered on the edge of the Floor that will become the front of the Hive.



The gable creates the slope of the roof and has the following measurements:



## Jigs

Make the following jigs on a scrape piece of plywood:

### Box Assembly Jig

This is 2X2 lumber screwed to the base 3/4" apart so that a box side can be slipped between them. A second set is then screwed to the base so that the second side can be stood up 12" away. The box end will then set on the two sides for gluing, drilling and screwing. The box is then inverted to attach the remaining end.



### Frame Assembly Jig

The Frame on which the bees will build their comb is a 3/4" X 1" X 12 3/4" bar with two 4" extensions set a little more than 3/8" in from each edge. We need 8 for each box or 224 total. Screw plywood blocks to the base near the edge to hold the extensions in place while you nail the bar to them.

## Frame Sanding Jig

For whatever reason, a 1" pine board is really only 3/4" and 3/4" plywood is slightly less than 3/4". We want the frames to be flush with the top edge of the rabbet in the side pieces of the boxes. To reduce the width of the bars we screwed blocks of plywood to the base to hold the frame bars in place as we used the belt sander to sand them down to width.

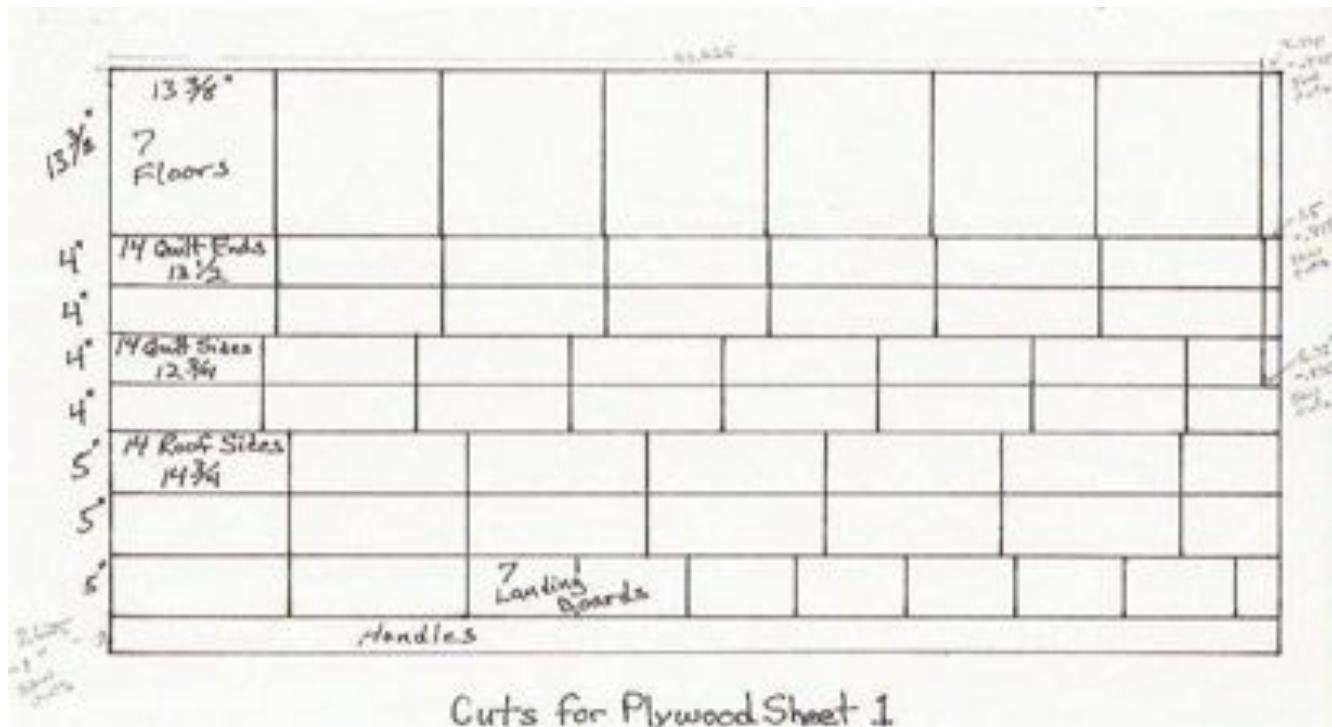


## Parts List

- 7 Quilt Bottoms – 15" X 15" Duck Cloth
- 7 Top Box Covers – 15" X 15" Duck Cloth
- 7 Roofs – 17 ½" X 23 5/8" Polycarbonate Roofing
- 7 Ceiling Boards – 3/8" X 15 ½" X 14"
- 7 Floors – 3/4" X 13 3/8" X 13 3/8" (3/4" Plywood unless noted)
- 7 Landing Boards – 3/4" X 5" X 9"
- 14 Quilt Ends – 3/4" X 4" X 13 ½"
- 14 Quilt Sides – 3/4" X 4" X 12 3/4"
- 14 Roof Sides – 3/4" X 5" X 14 3/4"
- 14 Roof Ends – 3/4" X 9" X 15 ½"
- 28 Feet – 4 X 4 X 6" Pine (optional)
- 28 Roof Mold Pieces – 4" each (molded to match curve in polycarbonate)
- 56 Box Sides – 3/4" X 9" X 12 3/4"
- 56 Box Ends – 3/4" X 9" X 13 ½"
- 56 Handles – 3/4" X ~2 ½" X 7 7/8"
- 224 Frame Top Bars – 3/4" X 1" X 12 3/4" - Pine Board
- 448 Frame Extenders – 3/4" X 1" X 4" - Pine Board

## Making the First Cuts

The first step is to make your rip cuts the long way on your plywood. You will be making 4 different width cuts.



### Step 1

Set the fence on your table saw to 13 3/8" from the blade. This is the width of the floor. Set your blade to a little more than 3/4" above the table. With one person holding the weight of the plywood sheet and one person guiding the sheet against the fence, run the sheet of plywood through the saw length wise creating a strip of plywood 8 feet long by 13 3/8 inch wide. Cut one piece that size and mark on it in pencil 13 3/8".

### Step 2

Reset your fence to 4" away from the blade. This is the width of the Quilt pieces. With one person holding the weight of the plywood sheet and one person guiding the sheet against the fence, run the sheet of plywood through the saw length wise creating a strip of plywood 8' long and 4" wide. Repeat at this width 3 more times making 4 strips of plywood 8' long and 4" wide. Mark all four pieces in pencil 4".

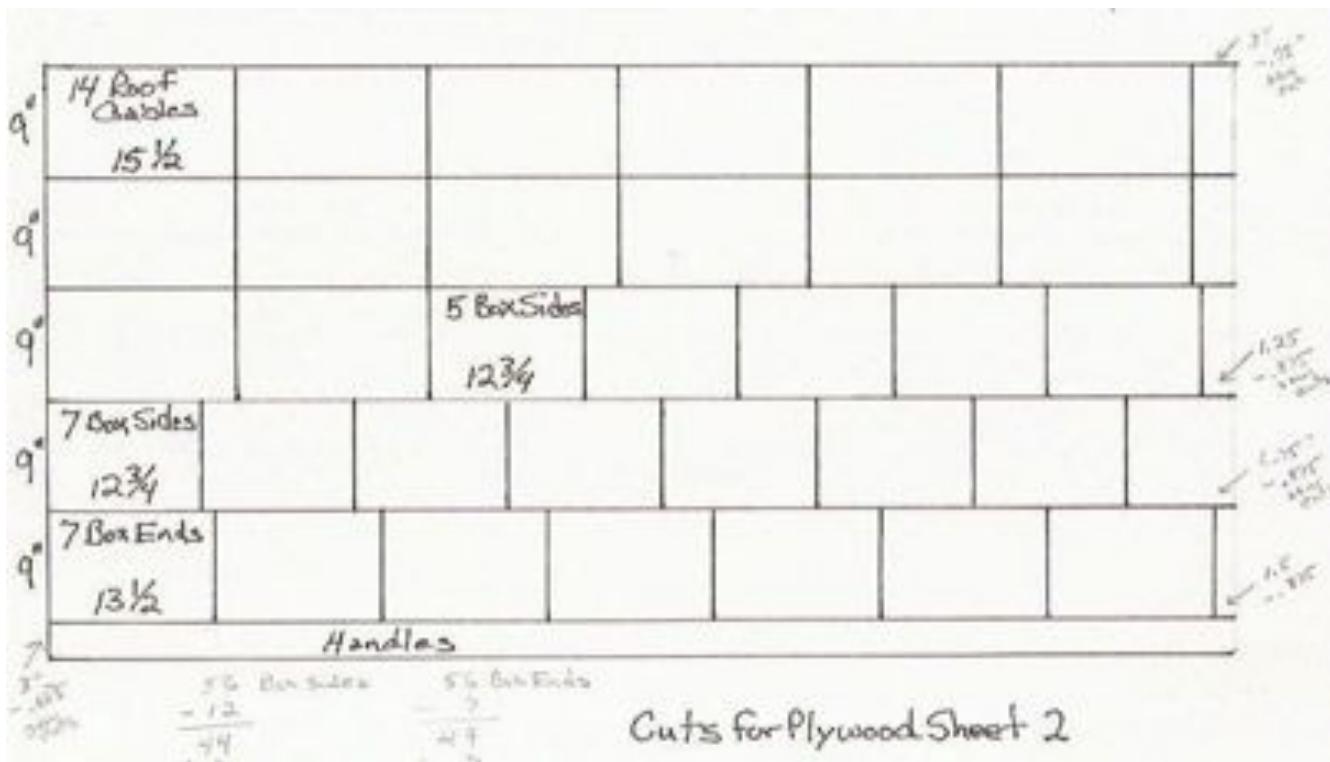
### Step 3

Reset your fence to 5" away from the blade. This is the width of the Roof Sides. With one person holding and one person guiding, run the sheet of plywood through the saw length wise creating 3 strips of plywood 8' long and 5" wide. Mark 5" on each strip with a pencil.

There will be a remaining strip about 2.5" wide. Mark the actual width in pencil on the strip and set aside.

### Step 4

Reset your fence to 9" away from the blade. This is the width of all the remaining pieces. With one person holding and one person guiding, run the remaining 4 sheets of plywood through the saw length wise creating 19 strips of plywood 8' long and 9" wide. Mark each strip with a pencil 9".



On three of the sheets, there will be a remaining strip a little less than 2 1/2" wide. The final sheet will have a remaining strip a little less than 11 1/2" wide. If you cut that final strip down to 9" you will have enough for a 29<sup>th</sup> Box and the remaining handles. Mark the actual width in pencil on each strip and set aside.

## Cutting the Pieces to Size

The plywood we used had a curve, making one side concave and one side convex. Make the inside of each piece the concave side by marking the outside of each piece with its name. This marking protocol will be important to the router operator.

### Step 1 – Floor Pieces

Reset your fence to 13 3/8" from the blade and your guide to square (90 degrees). Find the strip of plywood marked 13 3/8". With one person holding and one person guiding, set the plywood on the table with the concave side down, the narrow edge against the fence and the long edge in the guide set to square. Push the material through the saw creating a floor piece 13 3/8" X 13 3/8". Repeat the process until you have 7 floor pieces. Write "Floor" on the top (convex side) of each piece. The remaining strip is scrap.

### Step 2 – Quilt Ends

Reset your fence to 13 1/2" away from the blade. Find 2 of the strips marked 4". With one person holding and one person guiding, set the first strip on the saw with the concave side down, the narrow edge against the fence and the long edge in the guide set to square. Push the material through the saw creating a Quilt End 4" X 13 1/2". Repeat the process until you have 7 Quilt Ends from that strip and another 7 Quilt Ends from the second strip. Write "Quilt End" on the outside (convex) of each piece. There will be two narrow scrap pieces remaining.

### Step 3 – Quilt Sides

Reset your fence to 12 3/4" away from the blade. Find the remaining 2 strips marked 4". With one person holding and one person guiding, set the first strip on the saw with the concave side down, the narrow edge against the fence and the long edge in the guide set to square. Push the material through the saw creating a Quilt Side 4" X 12 3/4". Repeat the process until you have 7 Quilt Sides from that strip and another 7 Quilt Sides from the second strip. Write "Quilt Side" on the outside (convex) of each piece. There will be two narrow scrap pieces remaining.

### Step 4 – Roof Sides

Reset your fence to 14 3/4" away from the blade. Find the 3 strips marked 5". With one person holding and one person guiding, set the first strip on the saw with the concave side down, the narrow edge against the fence and the long edge in the guide set to square. Push the material through the saw creating a Roof Side 5" X 14 3/4". Repeat the process until you have 12 Roof Sides from 2 of the strips and 2 more from the last strip for a total of 14 Roof Sides. Write "Roof Side" on the outside (convex) of each piece. There will be two nearly square pieces that are scrap and a strip 5" X 66" that we will use to make Landing Boards.

## Step 5 – Roof Gables

Reset your fence to 15 1/2" away from the blade. Find 3 strips marked 9". With one person holding and one person guiding, set the first strip on the saw with the concave side down, the narrow edge against the fence and the long edge in the guide set to square. Push the material through the saw creating a Roof Gable 9" X 15 1/2". Repeat the process until you have 12 Roof Gables from 2 of the strips and 2 more from the 3rd strip for a total of 14 Roof Gables. Write "Roof Gable" on the outside (convex) of each piece. There will be two narrow pieces that are scrap and a strip 9" X 65" that you will use in Step 6.

## Step 6 – Box Sides

Reset your fence to 12 3/4" away from the blade. Take the 9" strip remaining from Step 5 and 8 more strips marked 9". With one person holding and one person guiding, set the first strip on the saw with the concave side down, the narrow edge against the fence and the long edge in the guide set to square. Push the material through the saw creating a Box Side 9" X 12 3/4". Repeat the process until you have 56 Box Sides. Write "Box Side" on the outside (convex) of each piece. There will be a narrow scrap piece from the first strip, a rectangular scrap piece from 7 of the remaining strips and a strip 9" X 71" that may be useful to replace any damaged pieces.

## Step 7 – Box Ends

Reset your fence to 13 1/2" away from the blade. Find the 8 remaining strips marked 9". With one person holding and one person guiding, set the first strip on the saw with the concave side down, the narrow edge against the fence and the long edge in the guide set to square. Push the material through the saw creating a Box End 9" X 13 1/2". Repeat the process until you have 56 Box Ends. Write "Box End" on the outside (convex) of each piece. There will be a narrow scrap piece from each of the strips.

## Miscellaneous Pieces

### Ceiling Boards

This board is set on the roof sides between the roof gables. It can be made any thickness that will hold the roof on top of the quilt. We are using 1/4" plywood because we have a scrap piece that will work. If you were buying plywood for this purpose I would go with 3/8". You will need about 1/2 sheet so perhaps the most efficient material usage is at 14 Warre Hives.

Set your fence to 15 1/2" from the blade and cut strips of plywood at least 98" long. Reset your fence to 14" and run the strips through until you have 7 Roof Ceilings 14" X 15 1/2".

## Landing Board

This board is screwed to the bottom of the Floor across the opening cut in the floor for the bees to enter the hive. If you use the piece left over from Step 4 and cut it into 9" long pieces, that would give you 7 5" X 9" pieces to screw to the bottom across the opening and sticking out an inch or two. In the prototype we used a scrap piece of red wood about that width and a little longer. Some of this decision will depend on how you will set up your hive and whether you are attaching legs directly to the floor piece.

## Legs

Our Langstroth hives are set on boards set on cinder blocks about 8" above the ground and we will be using those platforms for our Warre hives as well. We will attach 2X4s the length of the Langstroth base to make them stable on the existing platforms. The Warre materials recommend that you attach legs to the floor that are between 4" and 6" high. For the prototype we used scrap 4 X 4 from an old deck cut to 6" lengths and screwed through the top of the floor. We then set each leg on a concrete paver which goes for fifty cents at the lumber store.

## Handles

The handles can be just about any size that can be screwed to the outside of the boxes. About 2" by 9" seems about right. We will use the narrow strips remaining from 4 of the sheets of plywood which are, already, about 2 1/2" wide. If we cut them to 7 7/8" in length (to account for the width of the saw cuts), that will give us 12 pieces per strip or 48 handles. There will be other scrap pieces to work with for the remaining 8 handles. It will look better if all the handles on a hive are the same size so we may do some additional cutting to width as necessary.

## Polycarbonate Roofing

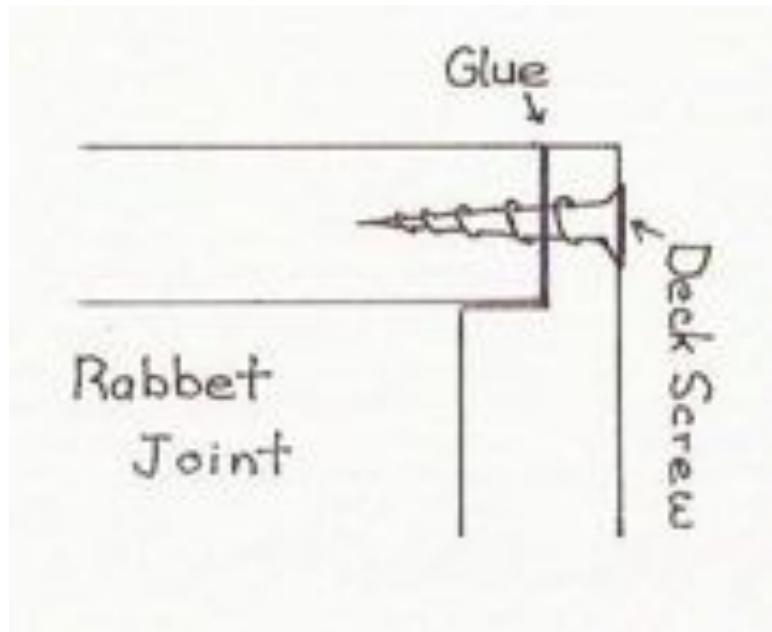
The polycarbonate roofing can be cut on the table saw. It comes in sheets 26" wide and 8' long. Set your fence to 23 5/8" and cut the sheet the long way making a pieces 23 5/8" X 8'. Then set your fence to 17 1/2" away from the blade push the material through the saw using your guide to keep it square. You will get 5 pieces 17 1/2" X 23 5/8" out of the first sheet and you will need 2 more out of the second sheet.

## Top Box Cover and Quilt Bottom

The Top Box Cover and the Quilt Bottom are made out of duck cloth (a canvas type fabric). Lay out the fabric on a flat surface and use a square to mark it at 15" X 15". Cut out the square with scissors. You will need 14 – 15" X 15" squares.

## Cutting Rabbets

There is a rabbet on each Box End to make the joint with the Box Sides and a rabbet at the top of each Box Side to accept the Frames. All of the rabbets are on the inside (concave side) of the piece.



Set your router table so that the router blade is  $3/8"$  above the table and  $3/4"$  out from the fence. This will give you a rabbet  $\frac{1}{2}$  way through the end board the width of the side board. Check the setting for your materials as material widths may vary.

### RABBET THE END PIECES

For each Quilt End, Roof Gable and Box End, place a short edge on the router table with the name of the piece showing (so that the concave side is down). Run the piece through the router and repeat for the other short edge.

### RABBET THE BOX SIDES

The top of each Box Side needs a rabbet to hold the Frames. Take each piece marked Box Side and select the long edge that will be the top. Place the piece on the router table with the top edge against the fence and the name of the piece showing. Run the piece through the router.

## Cutting Frame Pieces

The Frame Top piece is 3/4" X 1" X 12 3/4"

A 1X8 is 3/4" X 7 1/2" and we purchased 8 - 8' boards. We can cut the 8' boards into 7 pieces 12 3/4" long which is the length of the top piece of the frame. With saw cuts we can make 6 1" wide strips leaving a 3/4" wide strip out of each of those pieces making 42 pieces. We will use 5 and 1/3<sup>rd</sup> of the 1X8s to make all 224 of the Frame Top pieces.

The Frame Extender pieces are 3/4" X 1" X 4"

There will be enough left from 5 boards to make 1 - 4" piece. They will each make 6 - 1" strips for a total of 30 Frame Extenders. There is 64" on the 6<sup>th</sup> board which will make another 96 Frame Extenders. The 7<sup>th</sup> and 8<sup>th</sup> boards will each make 144 Frame Extenders. We will need another 34 Frame Extenders which will take 6 - 4" X 7 1/2" pieces. We will pick up a few extra pine boards from the discount bin at the lumber store.

For the Frame Top Piece:

Set your fence at 12 3/4" away from the blade and your guide to square. Set the 1X8 on the table with the narrow edge against the fence and the long edge against the guide. Push the material through the saw making a piece 7 1/2" X 12 3/4". Repeat until you have 38 pieces.

Set your fence to 1" away from the blade. Using a push stick with a notch to keep your hands well away from the blade, push each block through the saw six times making 6 - 1" X 12 3/4" pieces from each until you have a total of 224.

For the Frame Extenders:

Set your fence at 4" away from the blade and your guide to square. Set the 1X8 on the table with the narrow edge against the fence and the long edge against the guide. Push the material through the saw making a piece 7 1/2" X 4". Repeat until you have 75 pieces.

Set your fence to 1" away from the blade. Using a push stick with a notch to keep your hands well away from the blade, push each block through the saw six times making 6 - 1" X 4" pieces from each until you have a total of 448.

## Notch Floor for Bee Door

For each of the seven Floor pieces, select an edge that will be the front. Take the Bee Door Template you made above, lay it on the top of the piece with the door shape along the front edge and mark the shape on the piece with a pencil. Turn the piece over and repeat the process on the bottom of the piece.

Clamp the piece onto the working surface with the notch to be cut hanging over the edge and the bottom up. Take the circular saw and cut into the Floor along the short lines, past the long line, until the saw cut is at the long line on what will be the top of the Floor.

Then position the circular saw so that the blade is above the long line, pull up the guard, and lower the running saw down on the long line and past each short line until the saw cut is at each short line on what will be the top.

(This opening can also be made with a jig saw or hand saw.)

## Attach Landing Board

Find the 7 Landing Board pieces and the 7 Floor pieces with the bee doors cut out. For each, place the Floor piece top down on your working surface and position the Landing Board so that it covers the bee door and extends 2" past the front edge of the floor. Use 4 Deck Screws through the landing board and into the Floor.

Legs or other mounting pieces can be added now.

## Cut Roof Angles

Find the 14 Roof Gable pieces. Take the Roof Gable Template you made above and lay it on the outside of each piece and line it up with the edges. Mark along the angled edges with a pencil.

For each Roof Gable piece, clamp it to the working surface and cut along the mark with the circular saw.

## Assemble Roof

1 - Run each Roof Gable through the router to make a rabbet on the inside of both short edges. Set a Roof Side into the Box Assembly Jig and have someone hold another Roof Side 14 3/4" away. (The roof is bigger than the other pieces). Run a bead of glue down the rabbet on the Roof Gable. Place the Roof Gable on the Roof Side with the Side slide into the rabbet. Drill 2 - 3/32 holes through the Roof Gable rabbet into the edge of the Roof Side, one hole about an inch down from the top and the other

about an inch up from the bottom. Put a deck screw in each hole and tighten.

2 - Put the other Roof Side into the box assembly jig, turn the Roof Gable around, and glue, drill and screw that joint.

3 – Turn the three sided box over so that the two assembled joints are resting on your work surface. Run a bead of glue in both rabbets of a second Roof Gable, place it on the Roof Sides, with the angled edge in the same direction as the other Roof Gable, and drill and screw the remaining two joints.

4 – Find the 7 Ceiling Boards. For each of your assembled Roofs, set it upright on your work surface. Run a bead of glue along the top edge of both Roof Sides. Lay the Ceiling Board between the Roof Gables and line it up with the edges of the Roof Sides. Put four  $1 \frac{1}{2}$ " finish nails, evenly spaced, through the Ceiling Board and into the edge of the Roof Side. Repeat for the other side.

5 – Lay the Roof on one of the Gable ends and find a small piece of scrap plywood. Lay the scrap piece against the ceiling board in the center of the Gable. Secure the scrap piece in place with 2 deck screws. Turn the Roof over and repeat the process on the other Roof Gable.

6 – Find the 7 Polycarbonate Roof Pieces and 7 strips of Roof Molding. The Polycarbonate has a wave pattern that, from the edge, looks like a series of hills and valleys. The Roof Molding has matching hills and valleys. Cut the strip of molding into four pieces with two hills and one valley each. Lay the polycarbonate across the Roof with the  $17 \frac{1}{2}$ " width from the top of one Gable to the top of the other. There will be a central valley at the top of the Gable. Line up your Roof Mold pieces where they will match two hills in the polycarbonate down each slope of the roof and mark that location with a pencil.

7 – Attach the Roof Molding to the 2 slopes on each of the Roof Gables by running a little glue and nailing through the molding with 2 -  $1 \frac{1}{2}$ " finish nails. Lay the polycarbonate over the roof and align it with the hills in the molding. Overlap each edge evenly (about 1"). Drill through the polycarbonate into the top of each hill on each Roof Mold strip. Insert a roofing screw into each hole and tighten.

## Assemble Quilt

For each Quilt, find 2 Quilt Sides and 2 Quilt Ends. Cut a rabbet into the inside of both short edges of the Quilt Ends. Place 2 Quilt Sides into the Box Assembly Jig with the insides facing each other. Run a bead of glue along both rabbets in a Quilt End and align the rabbets with the Quilt Sides. Drill a  $\frac{3}{32}$ nd hole through the rabbet into the edge of the Quilt Side about an inch down from the top and another about an inch up from the bottom. Put a deck screw in each hole and tighten. Repeat for the second Quilt Side.

Remove the three piece Quilt from the jig and invert it onto your work surface. Run a bead of glue in both rabbets of the second Quilt End, align the rabbets with the Quilt Sides and drill and screw the joints as above.

Repeat for all 7 Quilts.

## Attach Quilt Bottom

When the glue has set on your Quilts, find 7 - 15" duck cloth squares. Select a bottom and a top for your Quilt. Place the Quilt upside down on your work surface and align the duck cloth across the bottom so that it hangs over evenly all the way around. Select an edge and put a staple through the cloth. Go to the opposite edge and stretch the fabric slightly and put a staple directly across from the first staple. Work your way around the edge until the duck cloth is secured and evenly taut.

Now set the Quilt on edge and fold under the overhanging duck cloth hiding the cut edge. Pull the folded duck cloth as tightly as possible and staple. Work your way around the Quilt pulling and stapling. At the corners you can cut out a small triangle of material so that the corner folds neatly.

Repeat for all 7 Quilts.

## Assemble Boxes

For each Box, find 2 Box Sides and 2 Box Ends. Cut a rabbet into the inside of both short edges of the Box Ends. Cut a rabbet into the inside top edge of each Box Side. Place 2 Box Sides into the Box Assembly Jig with the inside facing each other and the rabbet in the same direction. Run a bead of glue along both rabbets of a Box End and align the rabbets with the Box Sides in the jig. Drill a 3/32nd hole through the rabbet into the edge of the Box Side about an inch down from the top and another about an inch up from the bottom. Put a deck screw in each hole and tighten. Repeat for the second Box Side.

Remove the three piece Box from the jig and invert it onto your work surface. Run a bead of glue in both rabbets of the second Box End, align the rabbets with the Box Sides and drill and screw the joints as above.

Repeat for all 28 Boxes.

## Attach Handles

Find the Handle pieces. For each box you will need 2. For each hive you will need 8 of the same dimensions. Sort the Handles accordingly and make any cuts necessary to have the required 56 Handles.

Measure the Handles you will be attaching. Divide the width of the handle by 2 and add that amount to 4 1/2". On the Box Ends, measure up from the bottom 4 1/2" plus 1/2 the Handle width and make a mark in pencil. Divide the length of the handle by 2 and add that to 6 3/4". Measure across the length of each Box end 6 3/4" plus 1/2 the length of the Handle and make a mark.

Align the Handle with the marks and attach it to the Box End with two deck screws evenly spaced. Your Handle will be centered on the Box End. Repeat for the other Box End and for all 28 Boxes

## Assemble Frames

Place as many Frame Top pieces into your Frame Sanding Jig as it will hold. Sand down at least the end 3/8" until it is flush with the Jig. The sanded side will be the top of the piece. Repeat the process for the other end keeping the top the same.

Take two of the 3/4" X 1" X 4" Frame Extension pieces and put glue on one end. Place the spacers into the Frame Assembly Jig with the glued end on the outside. Take a sanded 3/4" X 1" X 12 3/4" Frame Top piece and place it into the Frame Assembly Jig perpendicular to the Frame Extension pieces with the top out. Drive 1 – 1 1/2" finish nail through the Frame Top into each Frame Extension. Remove the Frame from the Jig being careful that the Extensions do not twist. Set the Frame aside until the glue sets.

## Make a Frame Spacer

There are 8 Frames for each Box. The frames are installed with a 3/8" gap between each Box End and between each Frame. Make a Spacer to help with installation.

Cut a 3/4" board to a length of 12 3/4" and a width of at least 1 1/2" and no more than the maximum height of the blade in your table saw. Set your fence to 3/8" away from the blade. With a push stick and being very careful to keep your hands well away from the blade, stand the Spacer piece on the 3/4" width and push it through the saw.

## Install Frames in the Boxes

But your Spacer into the rabbet on the Box Sides of a Box up against one Box End. Place a Frame up against the Spacer and drive a 1" brad through both ends of the Top Frame piece into the Box Side rabbet. Move your Spacer to the other side of the Frame you just installed and repeat the process for all 8 Frames.

Repeat for all 28 Boxes.