# How to Build a CONESTOGA HUT

## An Inexpensive and Durable Micro-Shelter

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EDITED BY Guy Maynard

# Contents

SPECIAL THANKS to those who contributed to the development and design of the Conestoga Hut in small or big ways:

My wife Kristin Fay, Finn Po, Christopher Scott, Charles Castle, Zachary "Skip" Waddell, Jim Schmidt and the Hut Crew, Henry Schmald, Fred Wesley, Mica Camp, Jean Stacey, Dan Bryant and the First Christian Church congregation, Craig Satein, Alex Daniels, Andrew Heben, Episcopal Church of the Resurrection (first church to host Conestoga Huts), Mark Hubbard and Diane Sciana (first residents of a Conestoga Hut besides our family), Roy Nelson, Eugene Mayor Piercy and the city counselors who voted to allow the Hut to be part of Eugene Code 4.816 (Permitted Overnight Camping), Saint Vincent de Paul of Lane County, and Bring Recycling Planet Improvement Center.

And, to all the countless others who have shared their experiences living in a Conestoga Hut or volunteered their time to help build them at one time or another.

# Summary: A Bird's-Eye View

The start-to-finish, bird's-eye view, process of building one Conestoga Hut:

**Step 1** Gather all the tools and materials needed for the project, shown on the next few pages, and find yourself a workspace with a flat open area (e.g., a garage with work benches).

**Step 2** After studying the steps and the specifications in this manual, construct and assemble the five components of the Hut. Keep in mind that the individual components sometimes are made up of separate, smaller pieces. This step, if well planned, will take approximately three full workdays with at least two people participating.

**Step 3** Once you have completed constructing the five components you need a site to assemble the components. (Locating a site can happen at any time during or after the building process, but for the purposes of this manual, it is listed in this step.)

**Step 4** Find five to six people to assemble the Hut's components at its final destination. With this many people, assembly takes approximately two hours, providing they have some building experience.

**Step 5** There is a logical order to how the components go together. First, set up and level the foundation, next place the two-piece floor, followed by the front and back walls, the deck, and the roof. Nearly all the components are assembled using self-drilling screws (of varying lengths).

**Step 6** Add some finishing necessities (such as a bed frame and mattress, window curtains, smoke detector, etc.). Clean up leftover materials and reorganize your tools for the next Hut (assuming you are not stopping at one).

**Step 7** Hand over the Hut keys to someone who doesn't have shelter. (There's a lot more to it than handing over the keys, but this is the best part of the process.)

# SECTION ONE:
# WHAT YOU WILL NEED

**Detailed lists of the materials, tools, patterns, and jigs that we use in building Conestoga Huts.**

# List of Materials

| *Materials* | *Quantity* | *Purpose* |
|---|---|---|
| **Foundation** | | |
| Cement pier blocks | 4 | foundation blocks |
| Adjustable galvanized pier block brackets | 4 | connection between block and beam |
| 4" X 4" X 10' lumber | 2 | foundation beams |
| **Floor** | | |
| 2" X 6" X 12' kiln dried lumber | 8 | floor framing |
| Nail strips for nail gun (10d)—smooth shank | ≈ 2 lbs. (or 1 box) | hardware—framing |
| Tyvek moisture fabric | ≈ 60 sq. ft. | attached underneath floor panels |
| 4' lath strip | 22 per Hut, or a bundle | holds on Tyvek & used on wall braces |
| 18 gauge, ¼" X 1" galvanized staples | 1 box | hardware—wall panelling |
| R-19 fiberglass insulation | ≈ 60 sq. ft. | insulation—floor |
| ¾" X 4' X 8' plywood (one sanded side preferred) | 2 | flooring |
| Floor paint | 1 gallon | floor paint |
| **Deck** | | |
| 2" X 6" X 14' kiln dried lumber | 4 | for deck surface |
| All-in-one wood stain & sealer (cedar tone) | 1 gallon | sealant—deck, wall braces, trim, interior walls |
| 2" X 4" X 12' lumber | 2 | deck joists and deck legs |
| **Walls** | | |
| R-13 fiberglass insulation | ≈ 65 sq. ft. | insulation—wall |
| 2" X 4" X 12' kiln dried lumber | 10 | wall framing |
| ½" X 4' X 8' plywood (one sanded side preferred) | 2 | exterior walls |
| ¼" X 4' X 8' plywood (one sanded side preferred) | 2 | interior walls |

| *Materials* | *Quantity* | *Purpose* |
|---|---|---|
| **Walls** (*continued*) | | |
| All-in-one wood stain & sealer | 1 gallon | sealant—exterior walls |
| 10X3" exterior deck screws (star head) | ≈3 lb. (or 1- 25 lb. box) | hardware—some framing, deck, misc. |
| Wall-end material* (4" X 16' long) | 2 | wall edge protection and barrier |
| 1" X 6" X 8' trim lumber (cedar preferred) | 4 | trim pieces |
| 30" standard hollow-core door | 1 | door |
| Deadbolt lockset & handle | 1 | door hardware |
| Exterior wood glue | ≈ 8 fl. oz. | door and window construction |
| Exterior grade wood filler | ≈ 8 oz. | wall finishing |
| Water-based, clear semi-gloss, spar urethane | 1 gallon | general sealant—bed slats, windows |
| 1 ½" finish nails | ≈ .5 lb. | hardware—attaching door/window stops |
| Vent screen 4" X 12" | 2 | wall vents |
| Tar paper strips (9" X 16') | 2 | interior wall flashing strips |
| Smoke/CO alarm | 1 | fire/smoke detection |
| Window curtain rod | 1 | for interior curtain |
| **Roof** | | |
| 2" X 2" X 10' lumber (stained or treated) | 2 | insulation lifter on interior floor |
| 1" hex roofing screws | ≈ 1 lb. | hardware—attaching TPO & vinyl membranes |
| 9 X 1¼" exterior deck screws (star head) | ≈ 3 lb. (or 1- 25 lb. box) | hardware—attaching cattle panels |
| 2" X 4" X 16' kiln dried lumber | 2 | wall braces |
| 50" X 16' cattle panel fencing | 4 | roof structure |
| ¾" galvanized plumbers tape (28 gauge) | ≈ 10 ft. roll | hardware—attaching cattle panels |
| 1" X 4' X 8' polystyrene insulation panel | 5 | interior insulation |
| 2" aluminum ducting tape | 1 roll | seams of interior insulation |
| Reflectix insulation layer 4' roll | 32 linear ft. | exterior insulation |

*A variety of materials can be used for the wall-end material. We most commonly use Reflectix insulation, but have also used scrap wax cardboard, tar paper, or builders paper.

| *Materials* | *Quantity* | *Purpose* |
|---|---|---|
| **Roof** (*continued*) | | |
| Reflectix insulation layer 2' roll | 16 linear ft. | exterior insulation |
| T-50, 3/8" heavy duty staples | 1 small package | hardware |
| Thermoplastic polyolefin (TPO) (18' X10') | 1 | roof membrane |
| 16 oz commercial grade vinyl (35' X 61") | 1 | roof membrane |
| 3/4" 200 psi PVC pipe* (10' lengths) | 3 | to make saddle clips |
| 1" hex roofing screws | 30-40 | for exterior attachment of roof membrane |
| Rebar ties | ≈ 21 | for joining together cattle panels |
| **Bed Frame (single)** | | |
| 2" X 4" X 12' kiln dried lumber | 3 | bed frame & legs |
| 1" X 6" X 14' lumber | 3 | bed slats & leg support |

*The pipe we use for making the saddle clips has an inside diameter of 3/4" (the hole) and an outside diameter of 1" (the outside surface of the pipe). At the store, the measurements printed on the pipe refer to the inside diameter.

# List of Tools and Jigs

This is a list of tools that we use to make Conestoga Huts. Some tools are more necessary than others in making Huts, and if you are only making one Hut you might not need all of them (the patterns and jigs, for example).

## ELECTRIC/CORDLESS TOOLS:

10" miter saw (chop saw)
Impact drivers and drills
Assortment of drill & driver bits
10" table saw
Jigsaw
Circular saw
Router—nice, but not necessary
Air compressor
Pneumatic nail gun (framing & 16 ga. finish)
Pneumatic 18 ga. staple gun
50' extension cord
6" orbital sander

## HAND TOOLS:

Hammer
Phillips screwdriver
Chisels
Manual staple gun
Chalk line
Flat bar
Retractable razor knives
25' tape measures
Pencils
4' or 6' levels
Speed square
Broom & dustpan
Stepladders
Ear & eye protection
Sawhorses
Spring clamps (3–4)
Paintbrushes
Paint rollers and paint tray
Work gloves
Kneepads
Putty knife
Handsaw
Tin snips
Rebar tie tool

## BUILDING PATTERNS:

### Wall patterns:

WJ1 – Sides of front wall
WJ2 – Top of wall
WJ3 – Top of sides rear wall
WJ4 – Bottom of rear wall

## JIGS:

PVC pipe rip jig
Marking tool for 2X4 wall blocks (page 20)
Wall footer
Wall stand
Wall jig table (useful if making more than two Huts)
Foundation block layout jig

# SECTION TWO:

# CONSTRUCTING THE COMPONENTS

**Each Conestoga Hut is made up of five separate modular components: the floor, deck, walls, roof, and foundation. This chapter contains step-by-step construction details for each component.**

# Component 1: The Floor

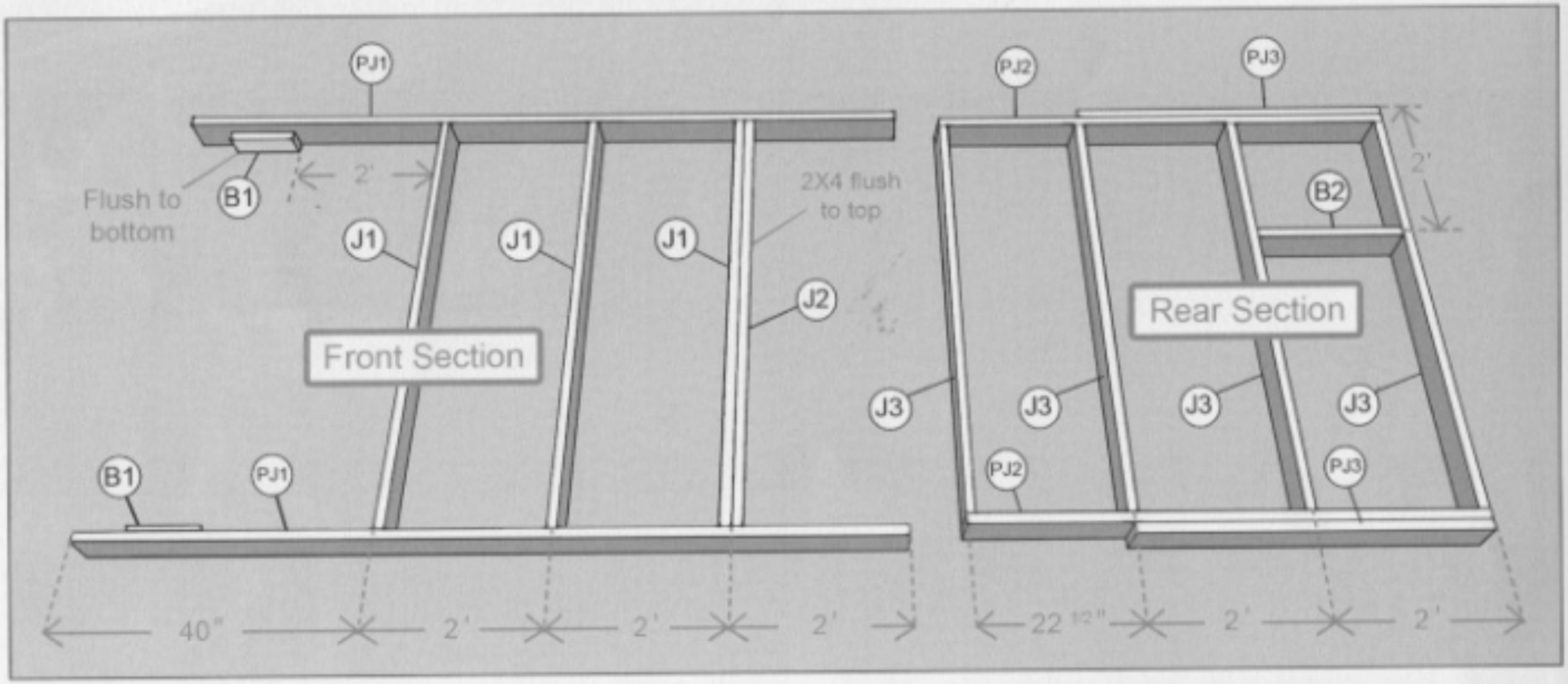



**Figure 1.** (Top view) Framing guide for floor sections

As **Figure 1** shows, the floor component is made of two separate sections so it can be moved by two or three people. Otherwise it's too heavy. The two sections interlock later when the Hut is assembled (see page 43).

The floor framing is covered with a flooring made of ¾" plywood, cut from two full 4'X8' sheets.

*Measurements for floor framing*

| Name | Material | Length | QTY/Floor |
|---|---|---|---|
| PJ1 - | 2X6 | 112" | 2 |
| PJ2 - | 2X6 | 70½" | 2 |
| PJ3 - | 2X6 | 48" | 2 |
| J1 - | 2X6 | 69" | 3 |
| **J2 -** | **2X4** | **69"** | **1** |
| J3 - | 2X6 | 65⅞" | 4 |
| **B1 -** | **2X4** | **10"** | **2** |
| B2 - | 2X6 | 21¾" | 1 |

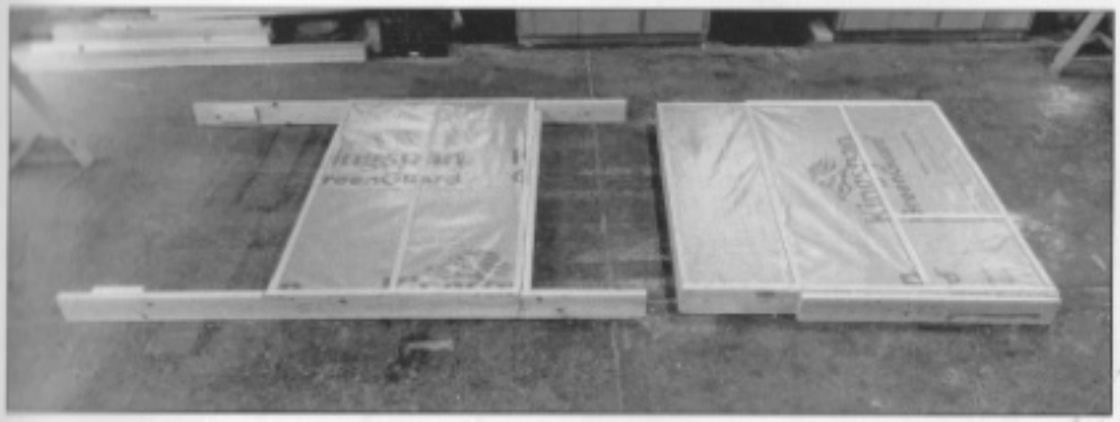


**Figure 2.** (Bottom view) Use 3/8" T-50 staples to attach the moisture barrier fabric and then use an air stapler with 18 ga. 1" staples to attach lath sticks to reinforce the fabric.

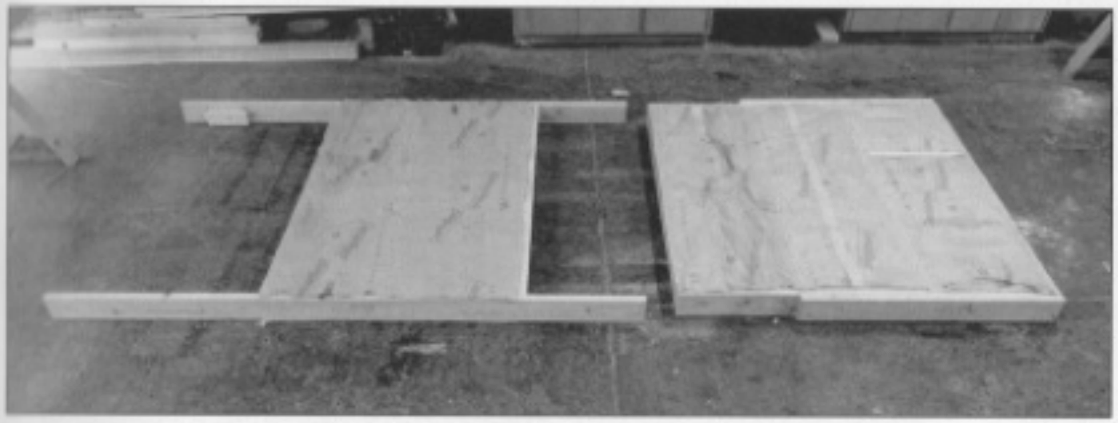


**Figure 3.** Insulated floor section ready to receive the subfloor panels

**IMPORTANT NOTE:** Use the 3-4-5 rule to make sure your floor frames are squared before attaching the plywood flooring. Go to YouTube and watch a video if you need more info about the 3-4-5 rule!

## BASIC ORDER FOR CONSTRUCTING THE FLOOR SECTIONS:

(1) Cut and fasten together the floor framing pieces (**fig. 1**).

(2) Staple moisture barrier and lath sticks to the bottom side of framing (**fig. 2**).

(3) Flip the floor over, insert and staple insulation with paper side up (**fig. 3**).

(4) Cut and attach the plywood flooring to framing (**figs. 4–5**).

(5) Apply two coats of latex floor paint to plywood (**fig. 6**).

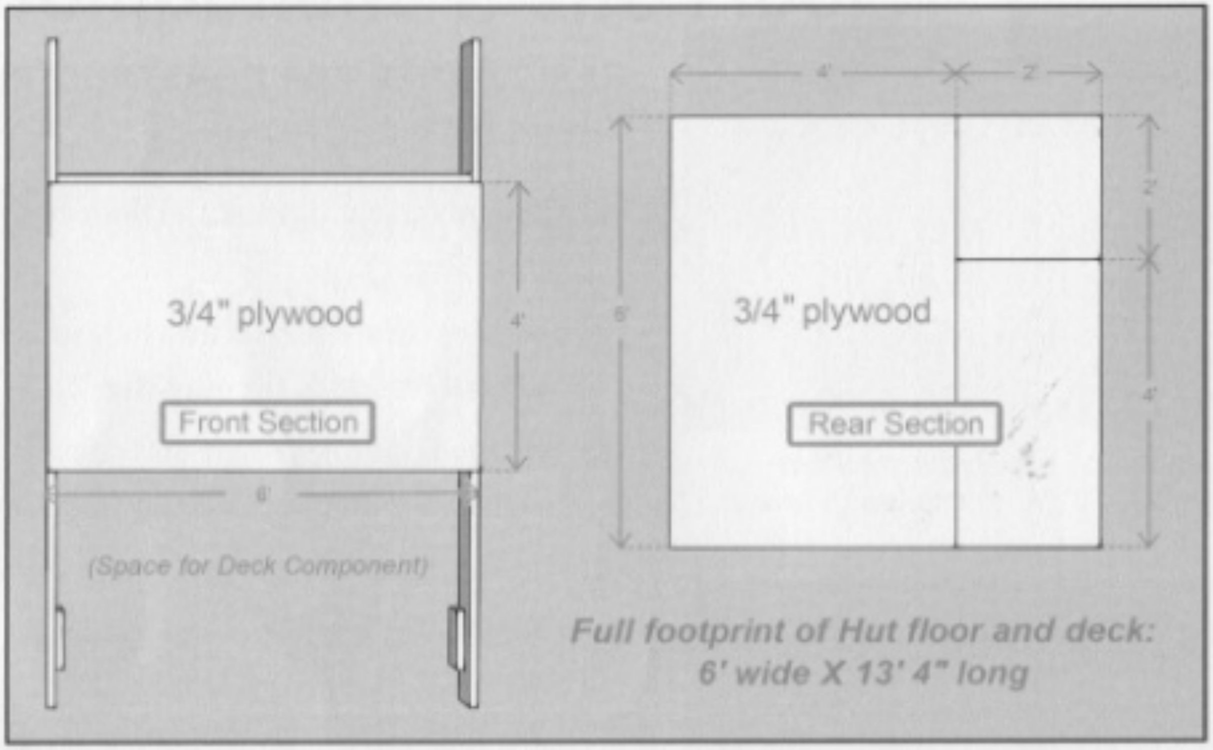



**Figure 4.** Dimensions of plywood floor pieces

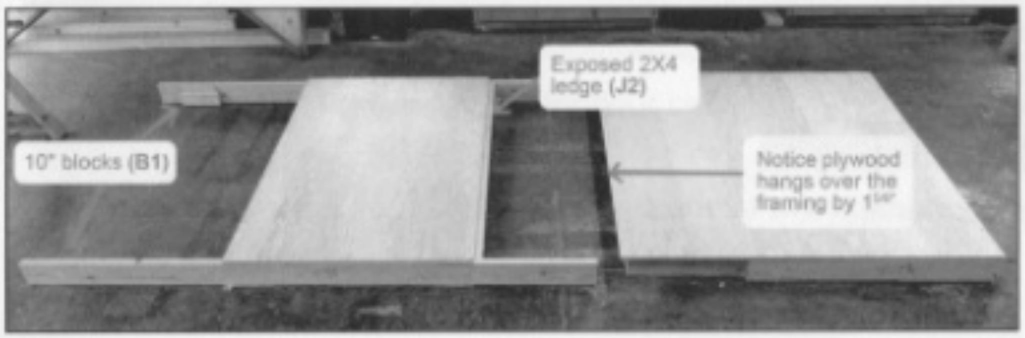



**Figure 5.** Plywood attached to the floor framing. Notice these important details of the floor construction, which come into play when interlocking the two sections of the floor. We use 2¼" deck screws to attach the plywood to the frame.

**Figure 6.** Plywood gets a thick coat of a darker colored floor paint. We use a darker color so the finished floor doesn't show dirt as easily.

# Component 2: Deck with Legs

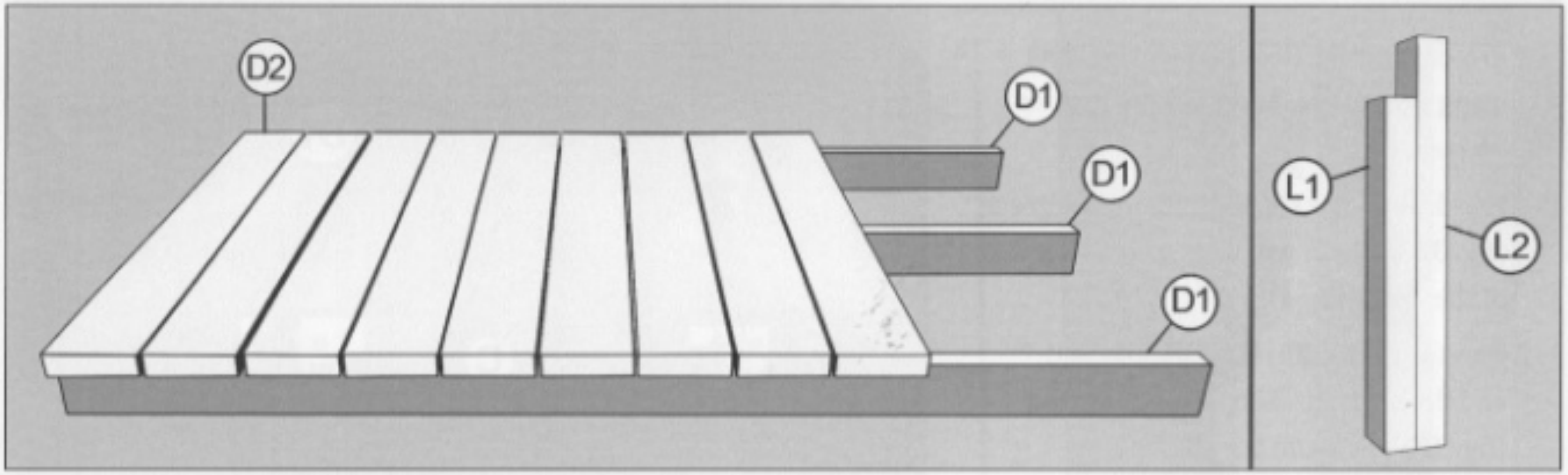



**Figure 1.** Framing guide for deck and legs


**Figure 2.** Picture of a finished deck without the legs

*Measurements for deck and two legs*

| Name | Material | Length | QTY/Deck |
|---|---|---|---|
| D1 - | 2X4 | 68⅞" | 3 |
| D2 - | 2X6 | 40½" | 12 |
| L1 - | 2X4 | 17" | 2 |
| L2 - | 2X4 | 20" | 2 |

**IMPORTANT NOTES:** The rear deck joist in **Figure 2** has five pre-drilled holes that will be used to attach it to the floor.

The legs for the deck are not fastened to the finished deck piece until the deck is connected to the floor (see pages 46–48 for this process).

## ORDER OF CONSTRUCTING A DECK:

**(1)** Pre-drill twelve deck boards (**fig. 3A**) using a template, based on the pattern on page 17.

**(2)** Pre-drill five or six holes in one D1 piece (**fig. 3B**), which will be placed to the rear of the deck (**fig. 4**).

**(3)** Carefully lay out the deck joists and end deck boards. Square-up the frame (**fig. 3C**) to ensure it is an accurate rectangle. Once it is square, fasten the end deck boards to the joist with 3" exterior deck screws.

**(4)** Finish laying out and fastening the remaining deck boards to the front and center joists, leaving even gaps between the boards (**fig. 3D**).

**(5)** Fasten the two leg pieces together with four 2¼" exterior deck screws. Make two legs. (See **fig. 5**)

**(6)** The final step is to apply an all-in-one stain and sealer for durability (**fig. 6**).

Your deck component is now complete!


**Figure 3.** Step-by-step pictures of the deck construction

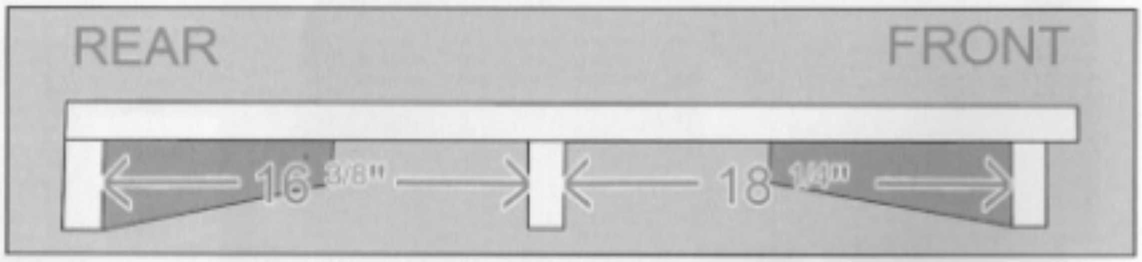



**Figure 4.** Distance between the deck joists

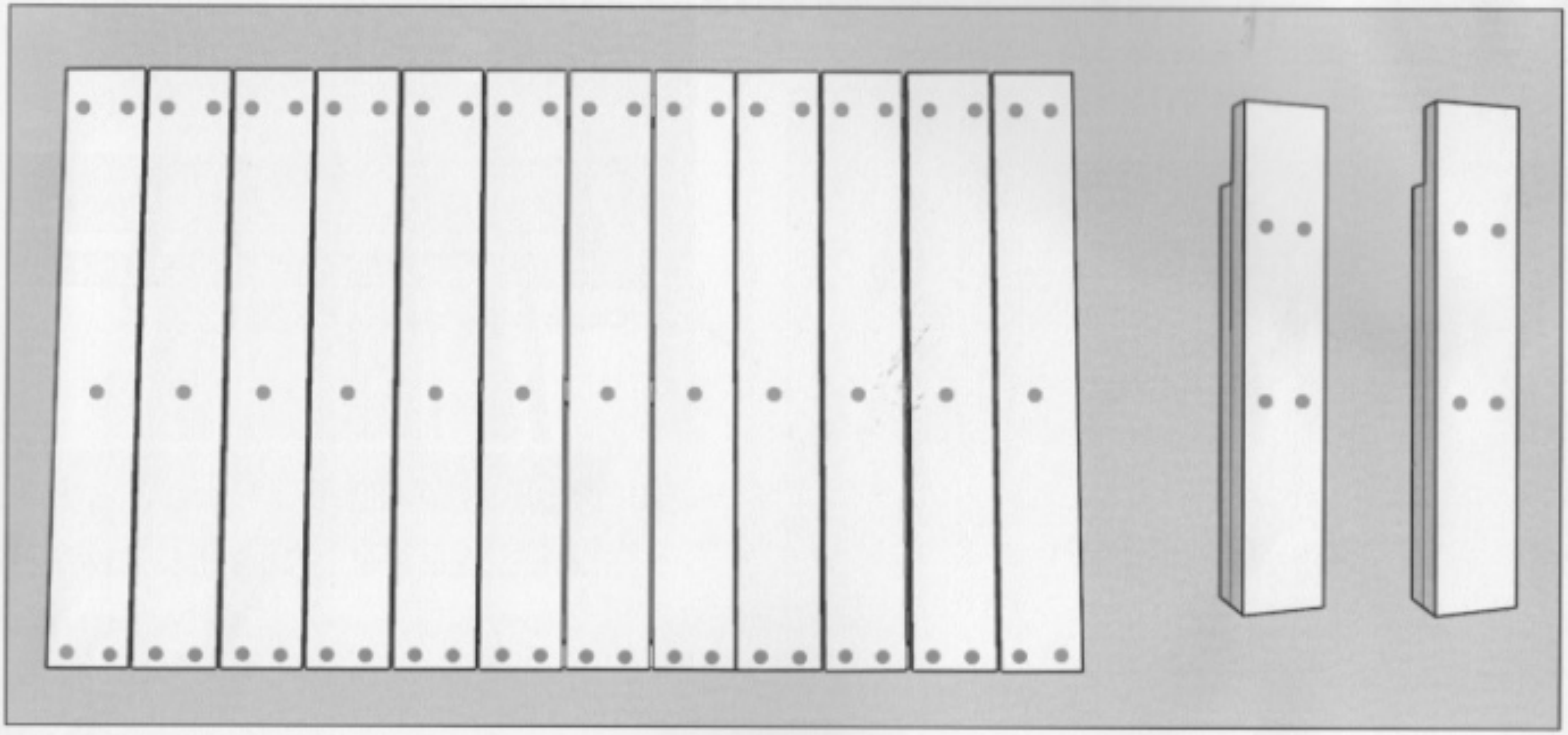


**Figure 5.** A guide for the finished screw pattern. The red dots represent pre-drilled holes that **DO NOT** receive screws at this stage while the green dots **DO** receive screws. Leg pieces are shown at right.

**Figure 6.** Applying cedar all-in-one stain and sealer to the deck

# Component 3A: The Walls, Front Wall

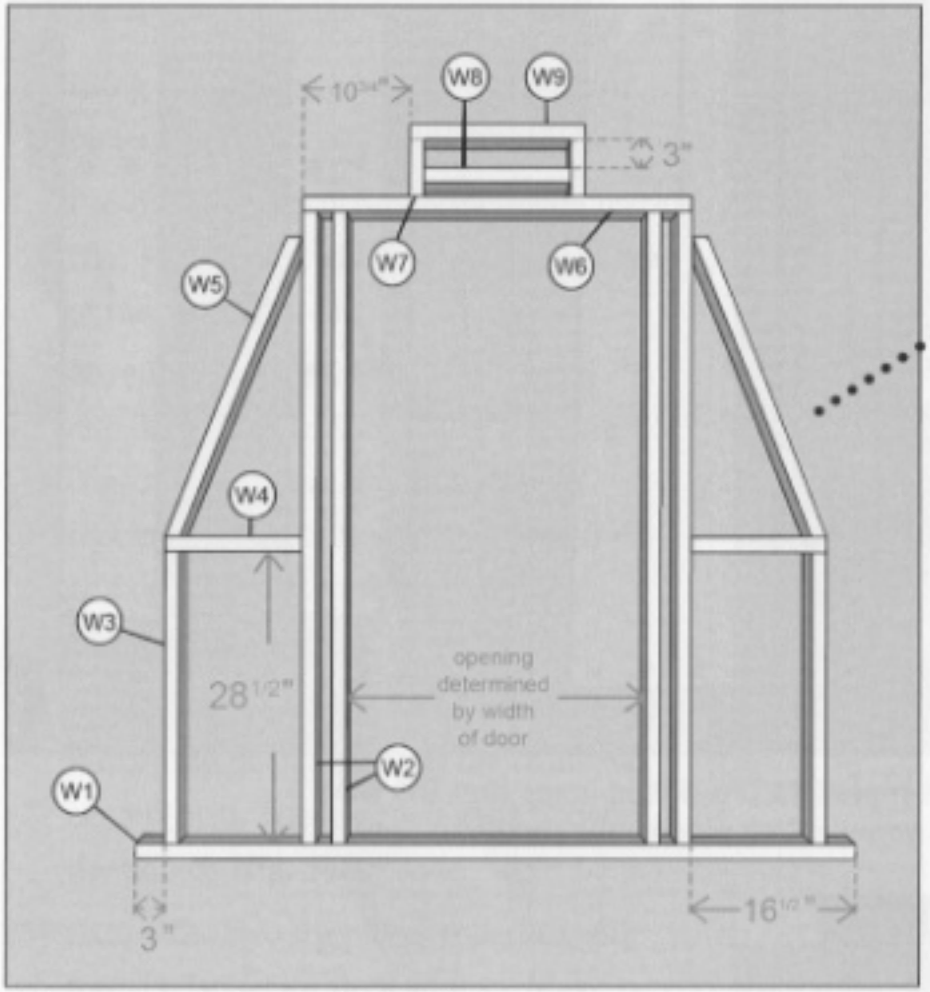
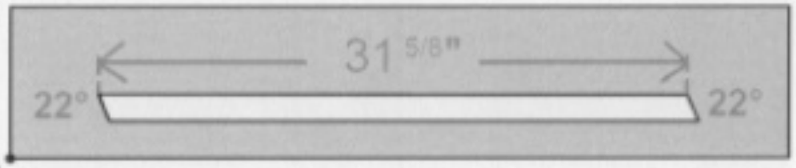



Figure 1. Framing guide for front wall




(Closer look at piece W5)

*Measurements for front wall*

| Name | Material | Length | Qty/Wall |
|---|---|---|---|
| W1 - | 2X4 | 72" | 1 |
| W2 - | 2X4 | 61¾" | 4 |
| W3 - | 2X4 | 28½" | 2 |
| W4 - | 2X4 | 13½" | 2 |
| W5 - | 2X4 | 31⅝" | 2 |
| W6 - | 2X4 | 39" | 1 |
| W7 - | 2X4 | 5⅝" | 2 |
| W8 - | 2X4 | 14½" | 1 |
| W9 - | 2X4 | 17½" | 1 |

**NOTE:** We typically use a 30" wide hollow-core door from a second-hand source. If it is a true 30" door (which means the door is exactly 30" wide), then the measurement between the two 2X4s that frame in the door should be 30¼". Simply add ¼" to the width of the door to determine the size of the opening.

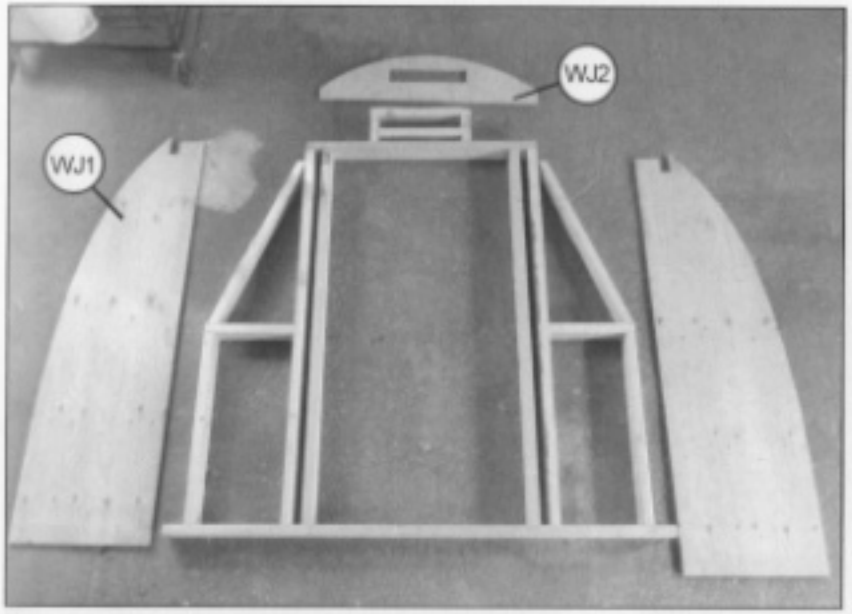



Figure 2. Front wall frame with pre-cut exterior wall panels WJ1 and WJ2

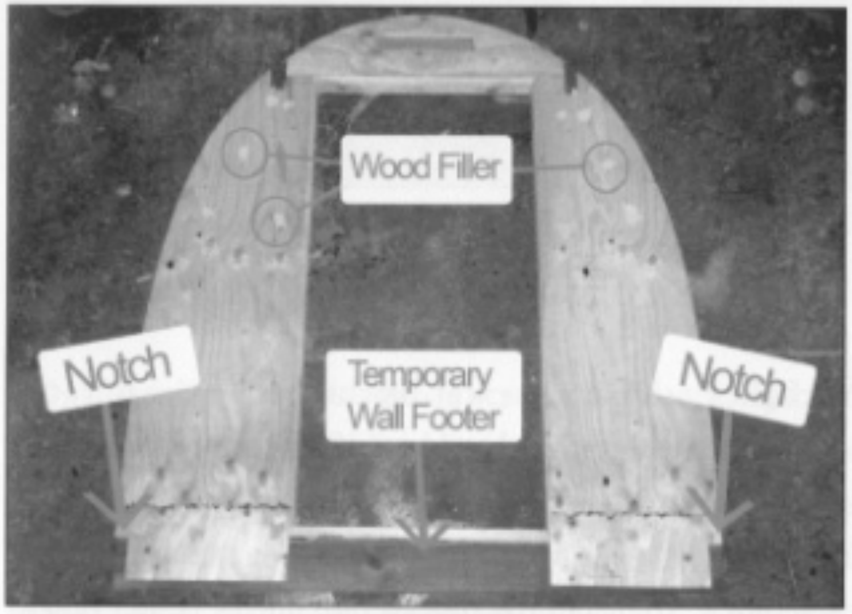



Figure 3. Front wall with attached exterior wall panels

## ORDER OF CONSTRUCTING THE FRONT WALL:

(1) Cut the framing pieces on a miter saw referencing the measurements on the previous page.

(2) Fasten the pieces together using 3" exterior deck screws or nails.

(3) Cut out the interior and exterior wall paneling (WJ1 and WJ2 in **fig. 2**) using a jigsaw and a circular saw (see dimensions for wall patterns on pages 58–59).

(4) Attach the exterior paneling (½" plywood) with screws or a nail gun, then use screws with washers to fasten the footer to the bottom of the wall (**fig. 3**). This temporary piece makes it easier to move and stand the wall up while working on it (see construction details on page 62). Cut a notch (dimensions: 1¾"X 5¾") from each corner of the exterior wall panels only (**fig. 3**).

(5) Flip the wall over so the exterior panel is facing the ground and insert insulation in the frame.

(6) Fasten the interior panel (¼" plywood) onto the frame with an air stapler to enclose the wall insulation.

(7) If desired, use wood filler to repair any imperfections or nail holes in the plywood (see **fig. 3**). Sand the wood filler and apply a stain and sealer to the wall surfaces.

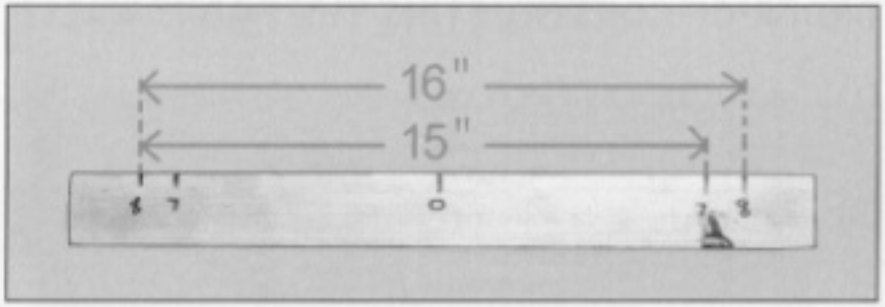



**Figure 4.** 2X4 wall block spacing tool. This simple-to-make tool accurately spaces the wall blocks.

**Figure 5.** Spacing tool is used to mark the positions of the 2X4 wall blocks.

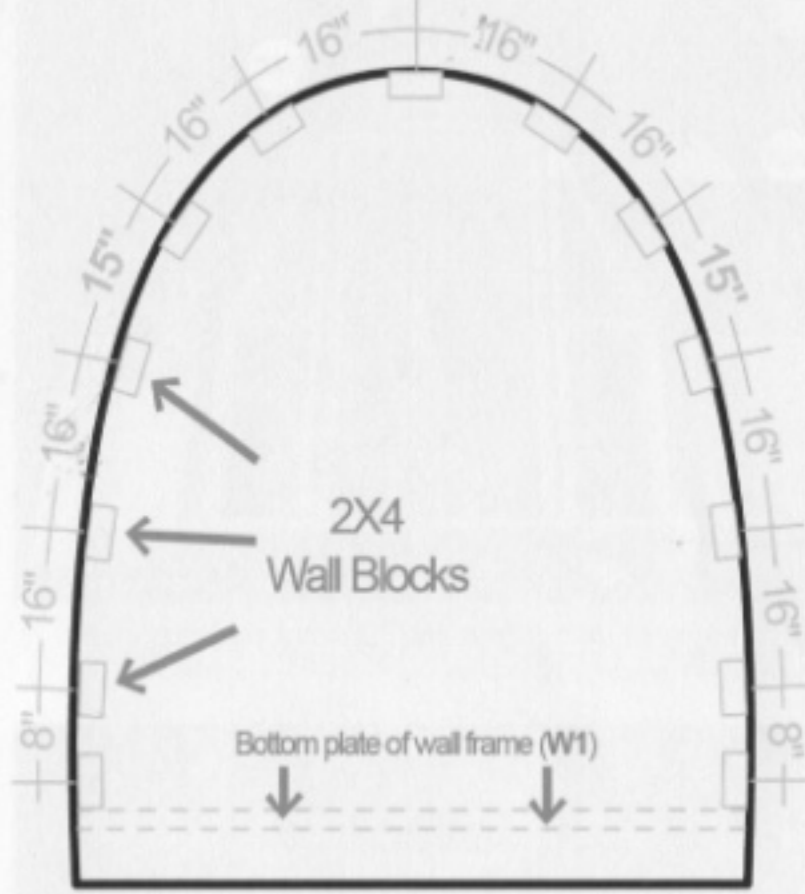



**Figure 6.** 2X4 wall blocks: spacing measurements

**(8)** Find the center of the wall at top by measuring the center of the vent hole and using a speed square to transfer that point to the top edge.

**(9)** Mark the position of the wall blocks on the edge of your wall. Start at the top and work your way down to the last block using the homemade spacing tool (**figs. 4 and 5**). The measurements in **Figure 6** give the center position of each block. To install the blocks, line up the center of the block roughly with the mark.

Figure 7. Wall blocks installed

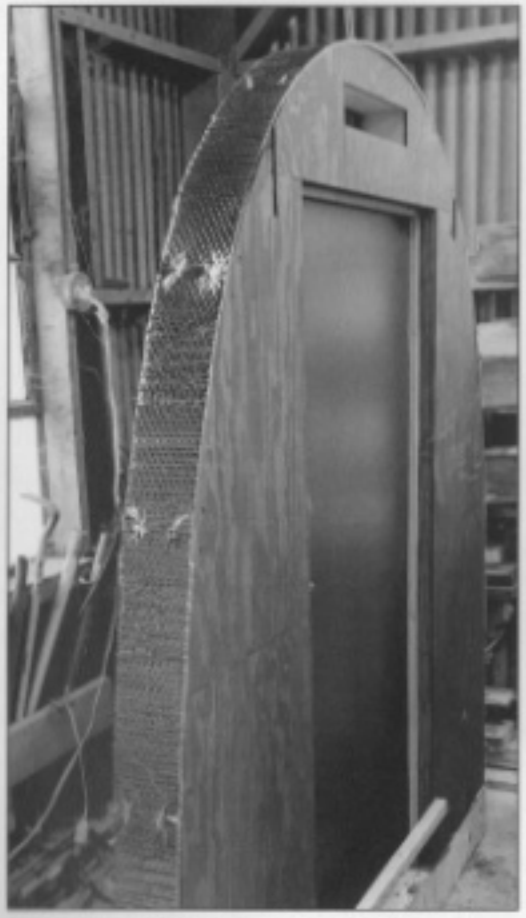


Figure 8. Wall-end material

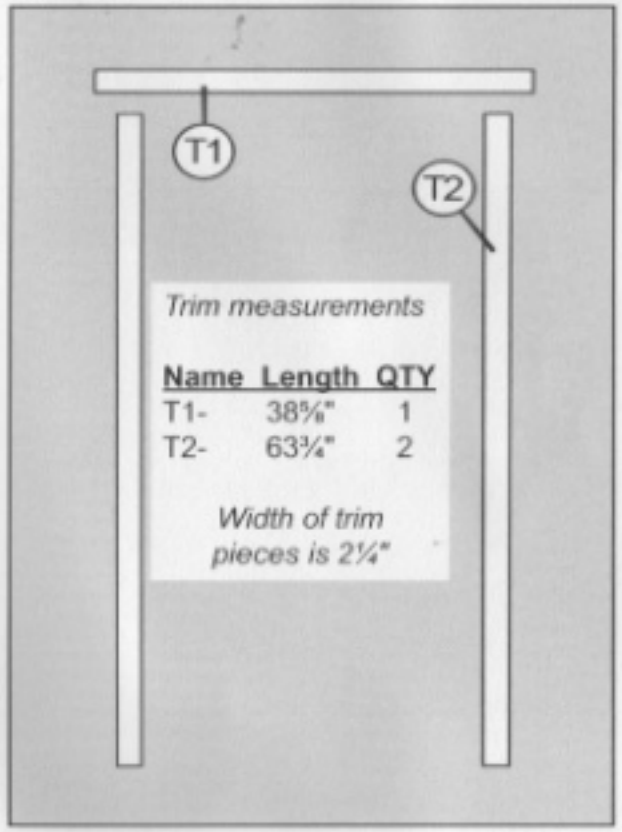



Figure 9. Door trim measurements

**(10)** Using 1¼" exterior grade screws, fasten the wall blocks in place. This is done with the wall laying horizontally by screwing one side and then flipping the wall over and doing the other side.

**(11)** Insulate wall with fiber insulation.

**(12)** Staple a strip of wall-end material to the wall blocks to cover the wall edge (**fig. 8**).

**(13)** Cut your trim pieces (**fig. 9**) on a chop saw.

**(14)** Apply an all-in-one stain (we use the same cedar tone that we apply to the decks) to the trim pieces and let dry.

**(15)** Modify a hollow-core door to fit the vertical measurement of the front wall's rough door opening. (See door construction on page 23.)

**(16)** Hang the door with two 3½" hinges to the appropriate side of the opening.

**NOTE:** We don't explain the whole process of hanging a door. If you don't know how to hang a door, basic instructions can be found with a quick internet search.

**(17)** Install door-jam strips around the interior perimeter of your door. We use strips of ¾"X¾" cedar.

**(18)** Finally, nail the exterior trim to your wall panel using 2½" galvanized finish nails.

**The front wall panel is now complete!**

**Figure 10.** Finished front wall panel with door, finish trim, vent screen, and temporary footer for moving wall around

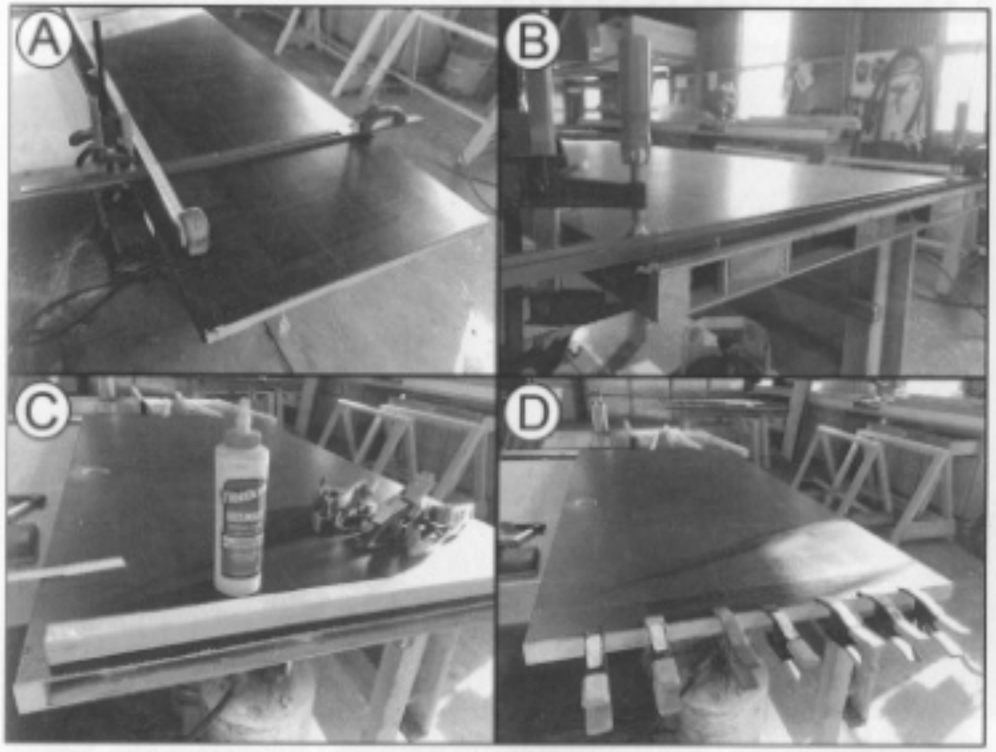



Figure 11. Step-by-step pictures of the door construction

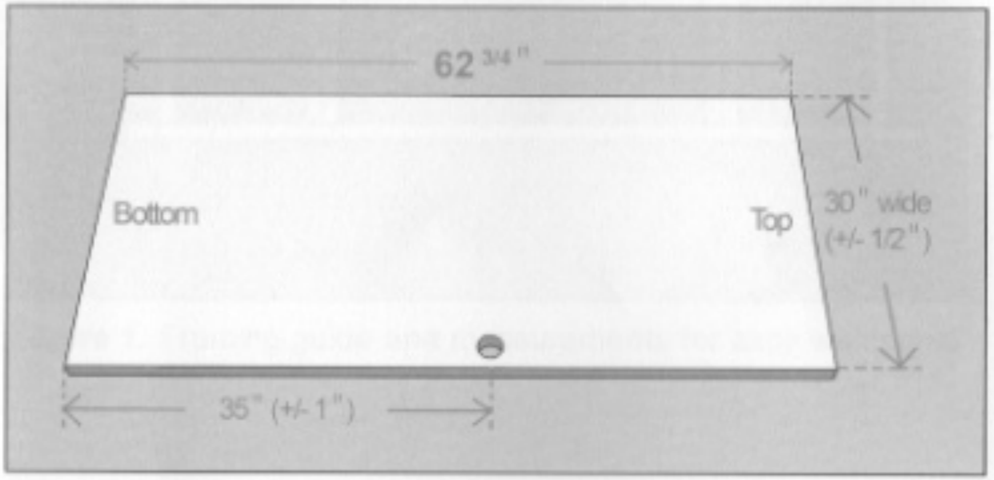



Figure 12. Dimensions of the door

## DOOR CONSTRUCTION

The door is made from reusing a used hollow-core door. Since the Hut is only about six feet tall we first need to make it much shorter. First (**fig. 11A**), following the dimensions shown in **Figure 12**, cut off the top of the door with a circular saw and straight edge. Take your time doing this. If you cut it wrong, you will need to find another door. Next, fill the cavity created by the cut (**fig. 11B**). Hollow core doors have ribs that give it strength. If the ribs in your door are made of cardboard you can push them aside to make room for a wooden plug. If they are made of wood, which is kind of rare, you may need to use a router to remove them. Measure the length and width of this opening (**fig. 11C**), carefully use a table saw to rip a 2X4 to your width, then cut to length, glue into place, and clamp overnight (**fig. 11D**).

**NOTE:** Before hanging the door, cut out the exposed portion of the W1 2X4 at the bottom of the door opening that sits on top of the temporary footer (see **fig. 3** on page 19). Otherwise, the door will not fit into the rough opening.

Before installing the door hardware lightly sand and paint the door with an exterior grade paint for extra protection from the elements. As you can imagine, hollow core doors are very vulnerable to the elements since they are typically used for interior uses only.

**A note about door handles:** A dead-bolt is our preferred locking mechanism for the Hut. This is because latch bolt style locks can be opened with a credit card or knife while a deadbolt cannot. We also install a simple handle for ease of door operation for the user (see **fig. 13**).

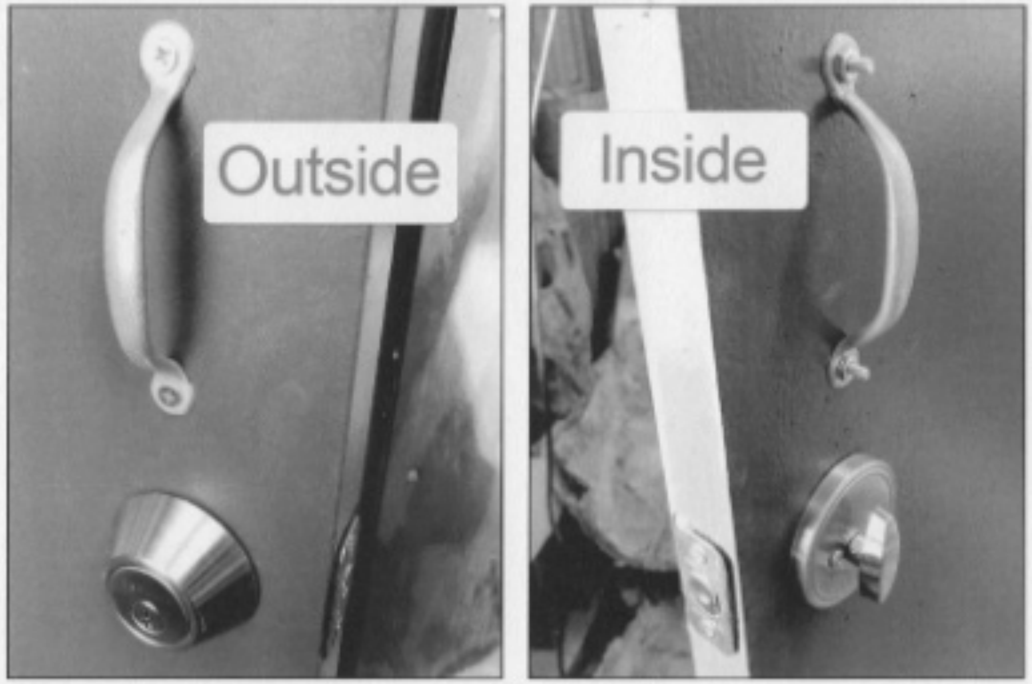



**Figure 13.**

# Component 3B: The Walls, Back Wall

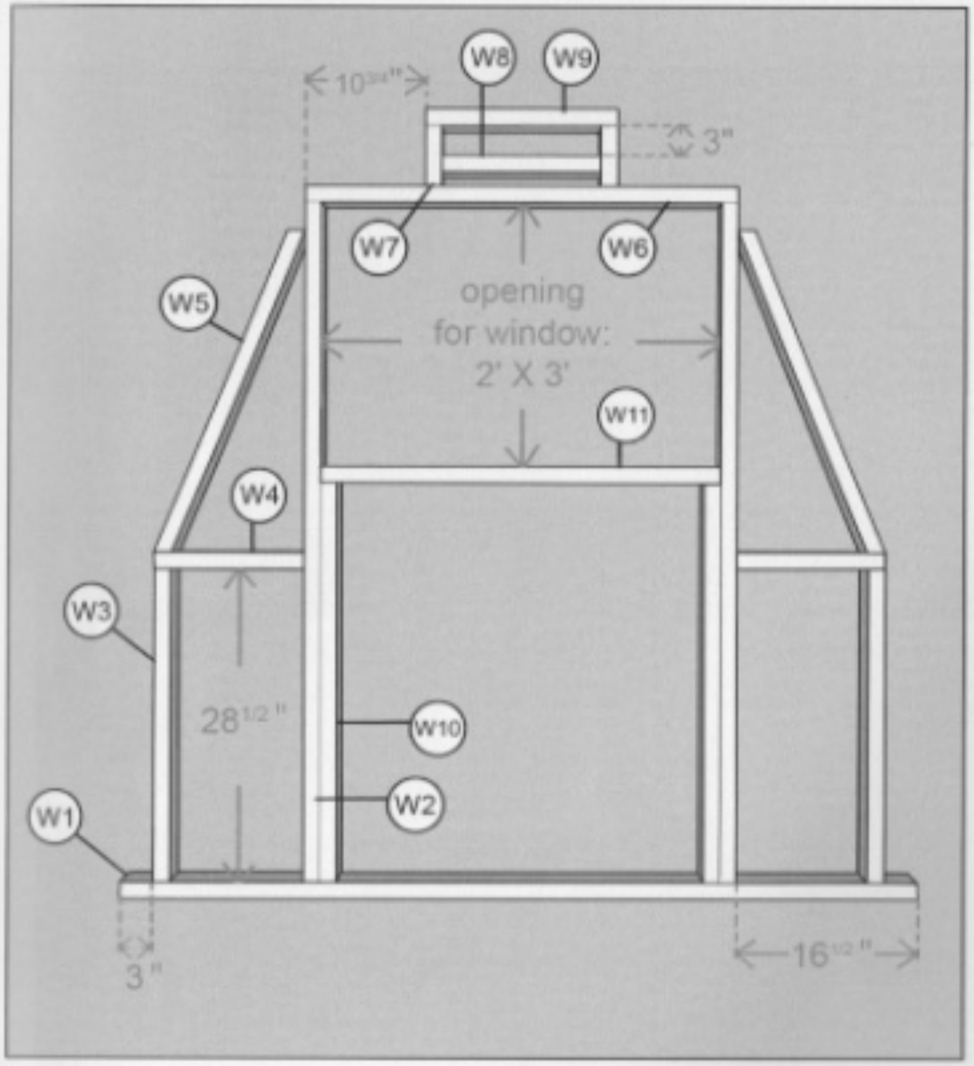



**Figure 1.** Framing guide and measurements for back wall panel

The back wall framing is nearly identical to the front wall except for a couple minor changes. Here are two involving the frame:

a) Only two **W2** pieces, instead of the four used in the front wall.

b) Three additional pieces for framing in the window: **W10** and **W11**.

*Measurements for back wall*

| Name | Material | Length | QTY/Wall |
|---|---|---|---|
| W1- | 2X4 | 72" | 1 |
| W2 - | 2X4 | 61¾" | 2 |
| W3- | 2X4 | 28½" | 2 |
| W4 - | 2X4 | 13½" | 2 |
| W5 - | 2X4 | 31⅝" | 2 |
| W6 - | 2X4 | 39" | 1 |
| W7 - | 2X4 | 5⅝" | 2 |
| W8 - | 2X4 | 14½" | 1 |
| W9 - | 2X4 | 17½" | 1 |
| W10 - | 2X4 | 36" | 2 |
| W11 - | 2X4 | 36" | 1 |

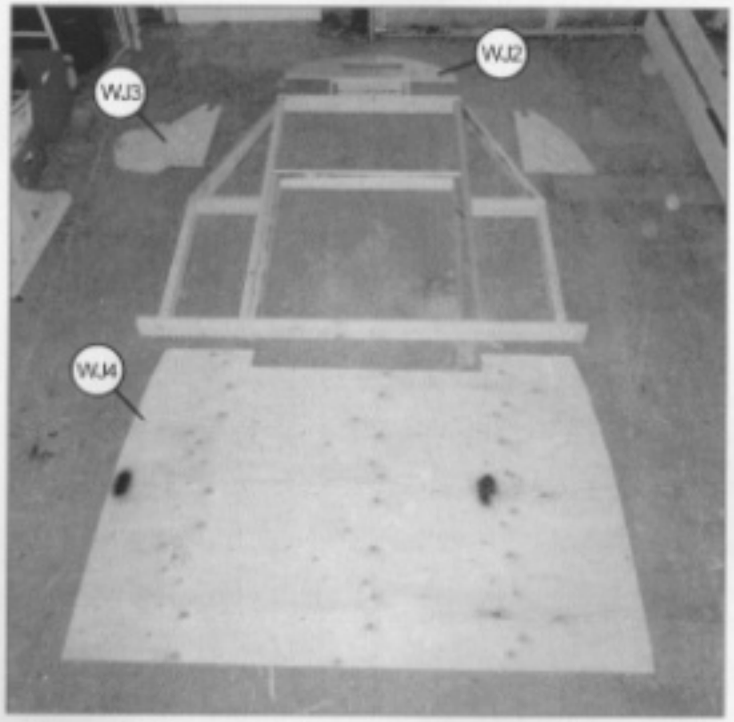



**Figure 2.** Back wall frame with pre-cut exterior wall panels WJ2, WJ3, and WJ4

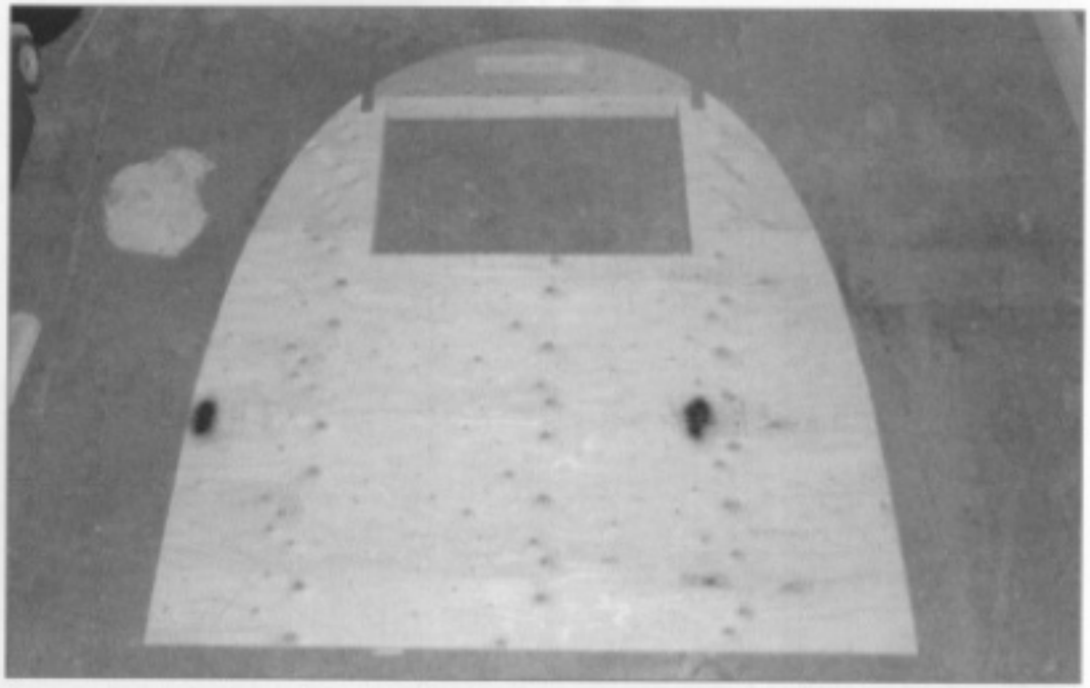


**Figure 3.** Back wall with attached exterior wall panels. Notice that the back wall does **NOT** have the notches cut from the corners.

## ORDER OF CONSTRUCTING THE BACK WALL:

(1) Cut the framing pieces on a miter saw using the measurements on the previous page (**fig. 1**).

(2) Fasten the pieces together using 3" exterior deck screws or a nail gun.

(3) Cut out the interior and exterior wall paneling (WJ2, WJ3 and WJ4 in **fig. 2**) using a jigsaw and the pattern dimensions on pages 59–60.

(4) Repeat steps **4** through **12** from the front wall construction steps **EXCEPT** the instructions regarding cutting the notches (**fig. 3**).

(5) Cut your trim pieces on a chop saw and table saw using the measurements in **Figure 4**.

(6) Sand the trim and apply an all-in-one stain to the trim pieces and let dry.

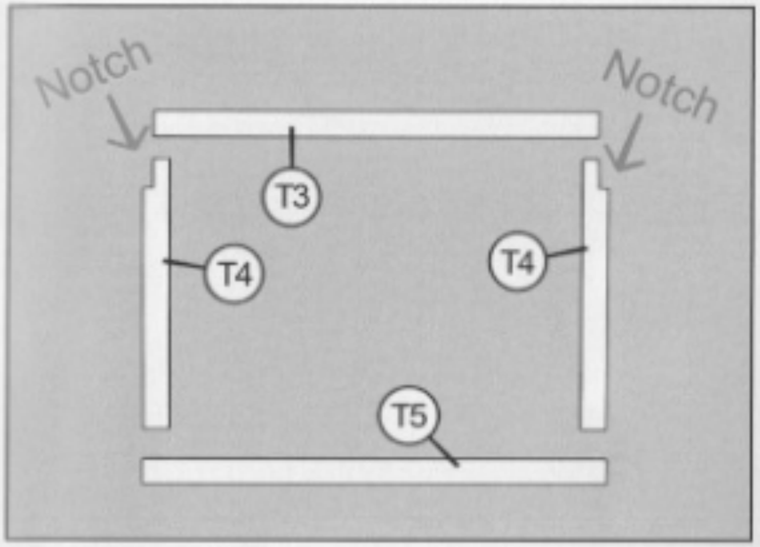



Figure 4. Window trim pieces and measurements

*Trim measurements*

| Name | Length | QTY |
|---|---|---|
| T3- | 39⅛" | 1 |
| *T4- | 24¼" | 2 |
| T5- | 41" | 1 |

*Width of trim pieces is 2¼"*

* Measurements of the cut out notches are ⅞" wide X 2⅝" tall.

Figure 5. A finished back wall panel

(7) Insert a 3'X2' vinyl slider window into the rough opening. After centering the window in the frame, use 1¼" exterior screws to fasten the vinyl window to the wall by screwing thru the window flange. We use 6–8 screws.

(8) Nail the four trim pieces to your wall panel, over the window flange, using 2 ½" galvanized finish nails (**fig. 5**).

**NOTE:** There are many ways to hang a window and lots of different opinions for how to do it right. Like the door hanging process, we don't go into detail about how to do this. We recommend getting more information from online sources if you need it.

**(9)** Trimming out the interior window: Measure the dimensions for a window sill. We make window sills flush with the interior sheathing so the people using the Huts can lean on the back wall without having a protruding sill jabbing into their backs (**fig. 6**). You can use ½" or ¾" board material to make the sill. After cutting it, give it a sand, stain/paint, and attach with finish nails.


**Figure 6.** A closer look at the interior of the vinyl window trim

**(10)** Use a table saw to rip three ⅝" X ⅝" pieces out of decent scrap material. These will be used as trim for the top (≈ 36") and both sides of the window (≈ 23") (**fig. 6**). We prefer to use cedar for the sill and trim since windows can produce condensation.

Alright, both walls are now ready for action!

# Component 4: The Roof Pieces

This component is not as compact and tidy as the walls, floor, or deck. It is an assemblage of fourteen separate pieces, some of which require preparation work before bringing them to the build site.

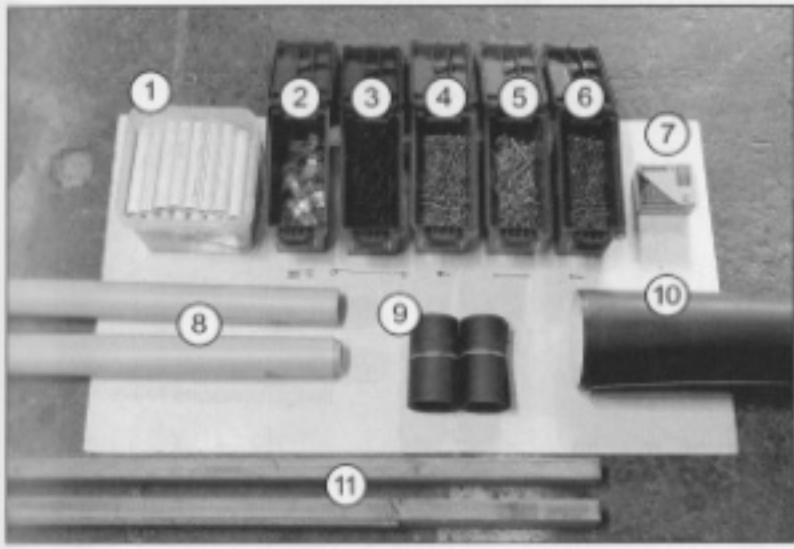



**Figure 1.** Roof pieces 1–11

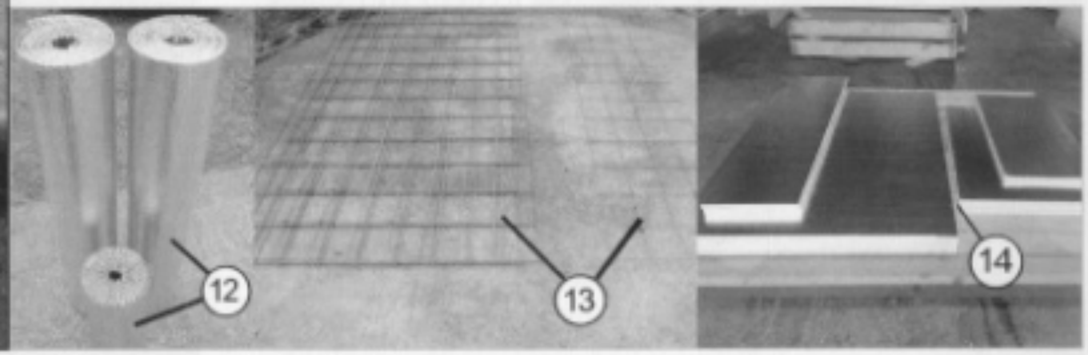



**Figure 2.** Roof pieces12–14

*List of roof pieces, the purpose, and the amount needed*

| Roof piece | Purpose | QTY/Roof |
|---|---|---|
| 1. PVC saddle clips | Secures outer membrane | 48 |
| 2. Plumbers tape straps | Secures cattle fencing | about 100 |
| 3. Rebar ties | Ties cattle fencing together | about 21 |
| 4. 1" hex roofing screws | Fastens roof membranes | 30-40 |
| 5. 3" deck screws (T-25 star drive) | Fastener for wall braces | a few |
| 6. 1¼" deck screws (T-25 star drive) | Fastener for cattle fencing | 3 lb. |
| 7. T-50 ⅜" staples | Attaches materials | a few |
| 8. Commercial vinyl material | Membrane over deck and rear overhang | 2 pieces |
| 9. Tar paper strips | Wall wrap/moisture barrier | 2 |
| 10. Thermoplastic polyolefin (TPO) | Roof membrane over interior | |
| 11. 2X4 wall braces | Braces walls/roof structure | 2 |
| 12. Reflective insulation | Insulation layer | 3 rolls |
| 13. 50"X16' cattle panel | Roof structure | 3½ |
| 14. R-Tech panels and aluminum tape | Insulation | 5 full sheets |

**PVC Saddle Clips—Prep Work:**

(1) Use a chop saw to cut the 1" PVC pipe into 7" sections (make sure the PVC pipe being used is "200 PSI," which is a thinner pipe).

(2) Build a PVC rip jig (see page 63) to help you safely run the pipe through the table saw.

(3) Cut a slit in each 7" pipe by pushing them through the rip jig clamped to the table saw (**fig. 3**). The table saw blade should be set to about ½" above the tabletop.

**NOTE:** Wear safety gear when performing this task. You can also rip the PVC pipe as full 10' lengths and then cut them on a chop saw into 7" sections.

*(See how these are used later on page 55)*

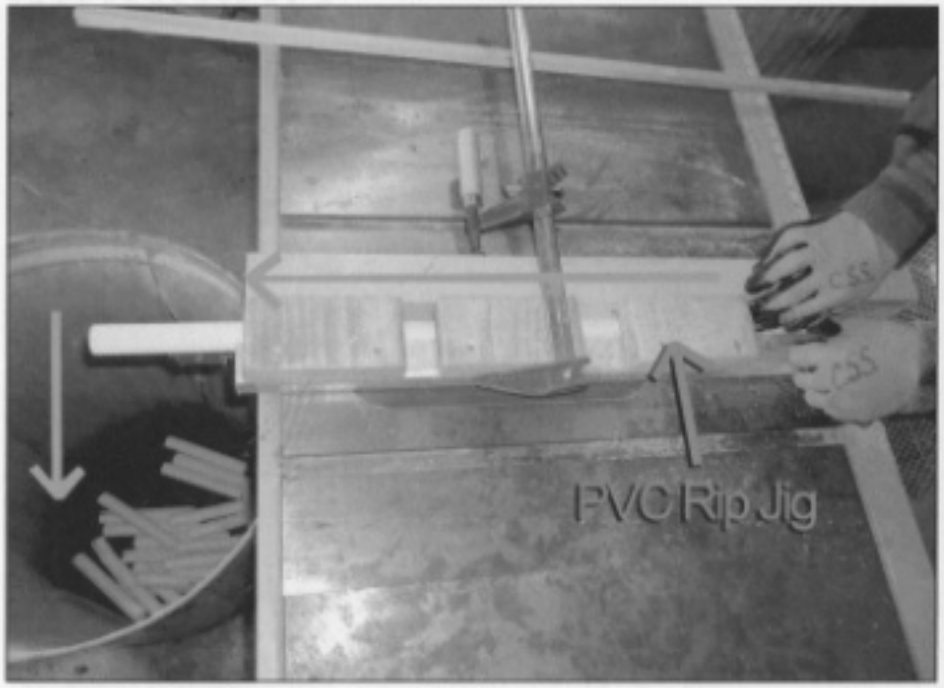



**Figure 3.** Cutting a slit in PVC pipe with a table saw and the PVC rip jig

**Plumbers Tape Straps—Prep Work:**

(1) Cut the strap material, using tin snips, at every other large hole (**fig. 4**). The finished piece should be about 2" in length.

(2) Collect the small pieces in a container to be used during Hut assembly.

(*See how these are used later on page 51*)

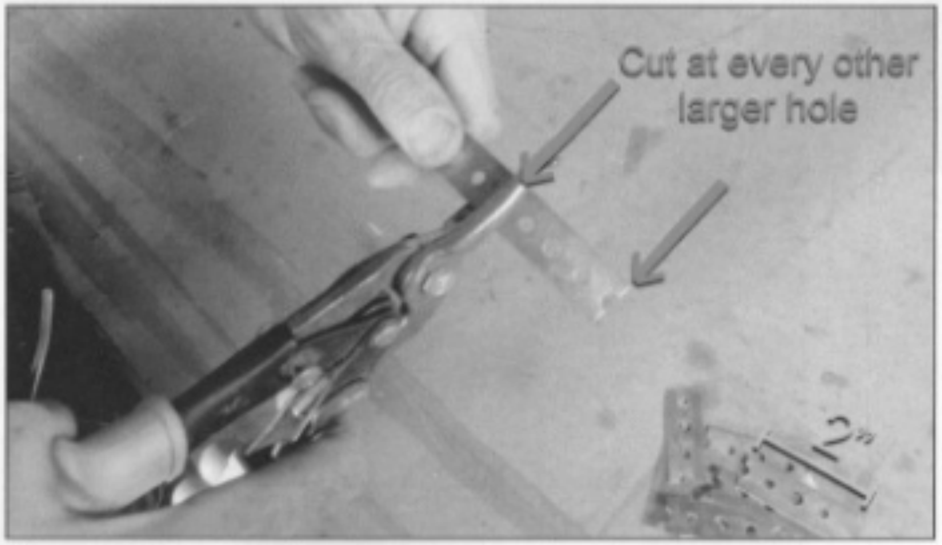



**Figure 4.** Cutting the plumbers tape brackets into 2" lengths

## About Wire Ties

The wire ties we use for attaching the cattle fencing panels together are called rebar ties. They come in large bundles at the hardware store, but you only need a small amount (20–30 pcs.) for tying the fencing panels together (see page 51). You may be able to find a small amount at a reuse building supply store if you have one in your area, or if you know a construction contractor chances are they have a few around.

Also, for a long time, we didn't use the specialized rebar tools. We simply cut short 5" lengths of general-purpose wire we could find and used pliers to twist together the seams of the panels. If you are trying to build one Hut, this could be your better option rather than trying to hunt down materials and a tool you are only going to use once.

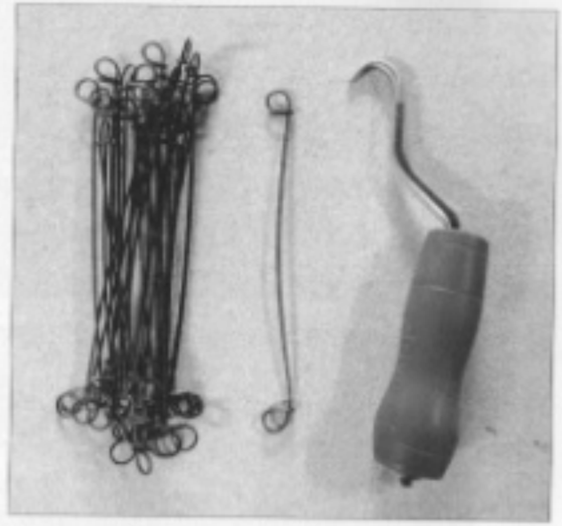


**Figure 5.**

**Roofing Felt Strips—Prep Work:**

(1) These small roles are cut from larger roles of roofing felt. There are lots of different ways to cut out this material. Study the dimensions in **Figure 6**.

(2) Using your method of choice—we typically use a razor knife (like the kind people use to break down boxes) with a fresh blade—cut your felt paper to the correct dimensions.

*(See page 49 for installation details)*

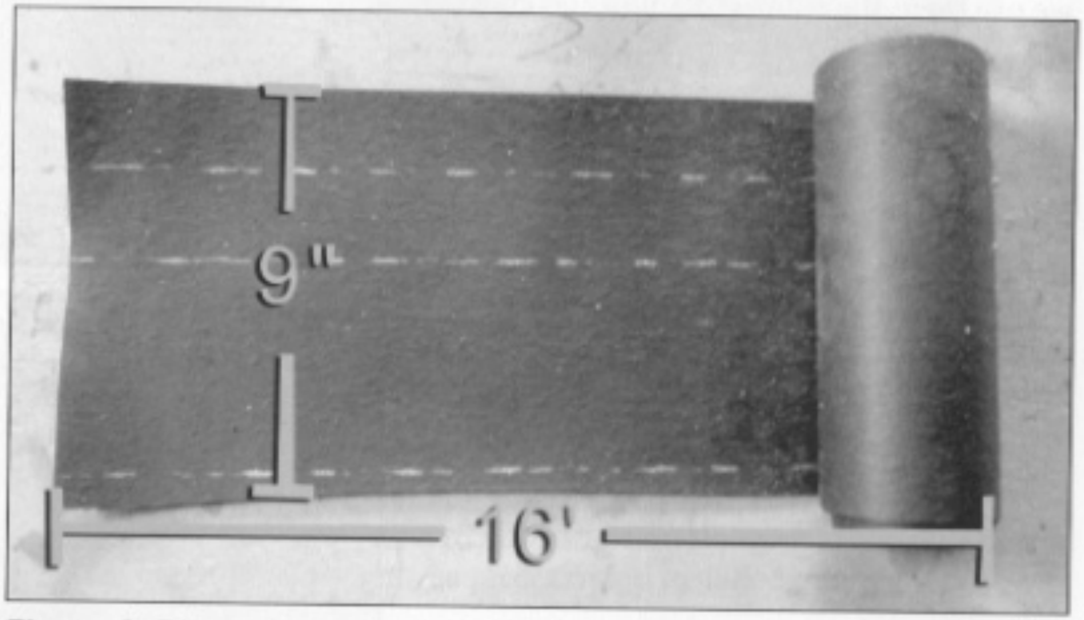



**Figure 6.** Dimensions of the tar paper strips. Two strips per Hut.

## The Roof Membrane

The roof membrane we currently use is made up of three separate pieces and two different types of materials (**fig. 7**). Over the main body of the hut is a roofing material called thermoplastic polyolefin (TPO) (**fig. 8**) and over the porch and rear eave section we typically use a tan colored, commercial grade tent vinyl. The main reasons for this design are for aesthetics and for ease of construction for volunteers

For more detailed information about TPO and vinyl, locating them, and why we use them the way we do, you can check out page 74 in the FAQ section.

The vinyl material we use comes in long rolls that are 61" wide. For the piece that covers the porch we roll out 17'6" of the material and cut it with a razor knife or scissors (**fig. 9**). For the piece to cover the rear eave, we cut another piece the same length in half (yielding pieces for two Huts). The easiest way that we have found to cut it is to roll it up tight and cut it on the chop saw.

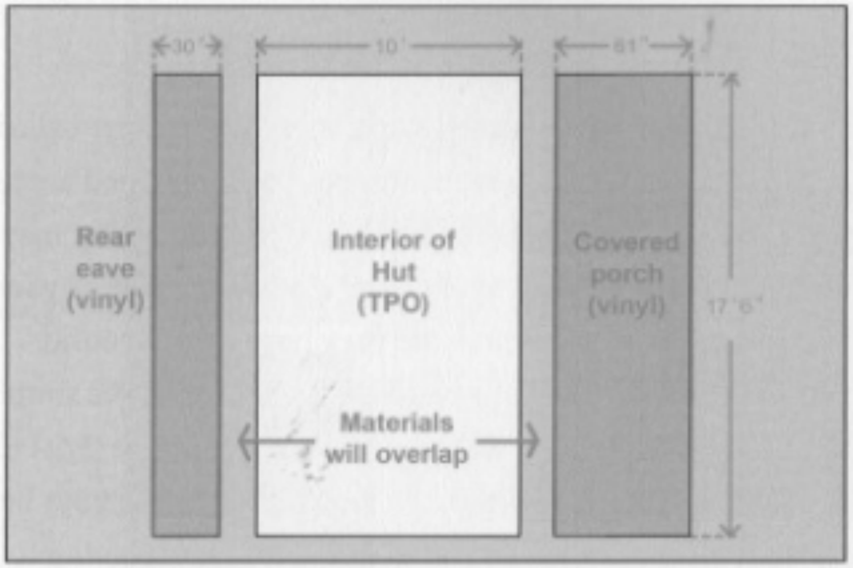



**Figure 7.** Dimensions of the 3 different roof membrane pieces

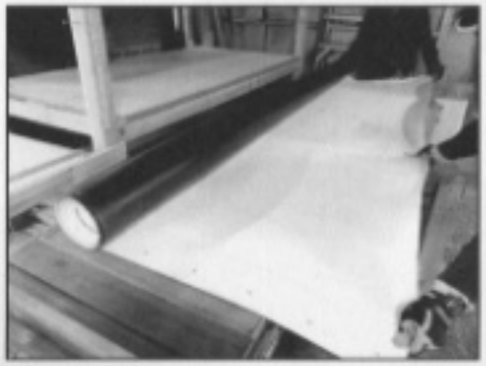


**Figure 8.** TPO: We purchase pre-cut rolls from a local roofing contractor. Small quantities of TPO are typically not sold at your general building supply stores.

**Figure 9.** (below) Cutting the vinyl material. Cutting the vinyl on a chop saw will produce some toxic fumes, so make sure you do it in an area that is well-ventilated and wear protective gear.

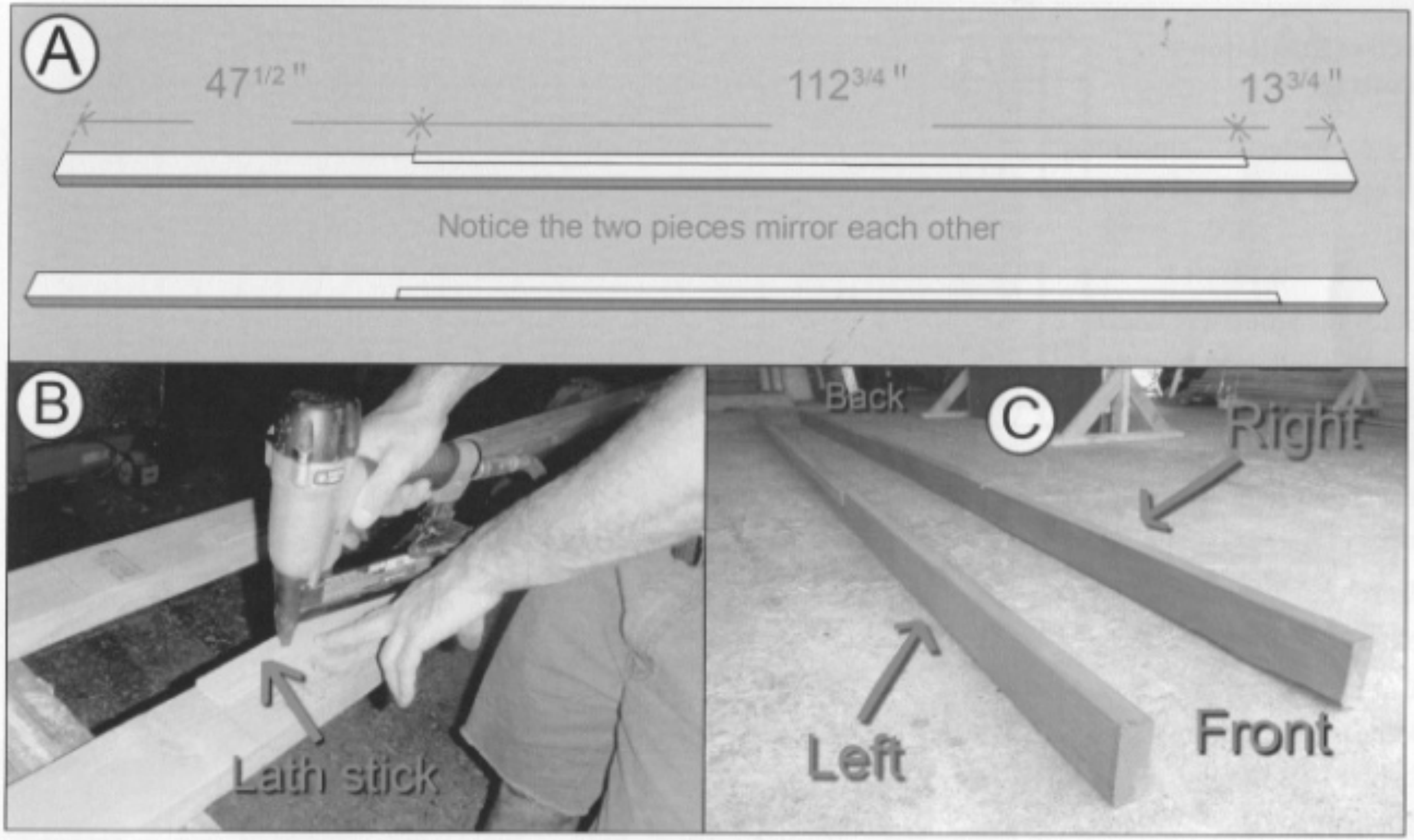



**Figure 10.** Measurements and steps for making the 2X4 wall braces

**2X4 Wall Braces—Prep Work (fig. 10):**

Study the measurements and orientation of the lath sticks and wall braces in **Figure 10A** carefully. After you have cut the two 2X4s, mark these measurements onto them and staple on the correct length of lath sticks (**fig. 10B**). Apply stain and sealer to each 2X4 wall brace. Notice there is a left and a right piece and a front and a back on each (see **fig. 10C**). To see these pieces being installed, see page 44.

**Reflective Insulation—Pre-cutting:**

We use Reflectix® insulation, which can be purchased at Home Depot.

**(1)** Study the amount of linear feet you will need from the 2'- and 4'-wide rolls. The red lettering in **Figure 11A** tells how many of each piece you need to construct one Hut.

**(2)** Unroll the proper length of your pieces (**fig. 11B**).

**(3)** Cut the piece with a razor knife using the lines of bubbles as a guide to make your cut straight. Roll up the pieces so they are easier to transport to the build site (**fig. 11C**).

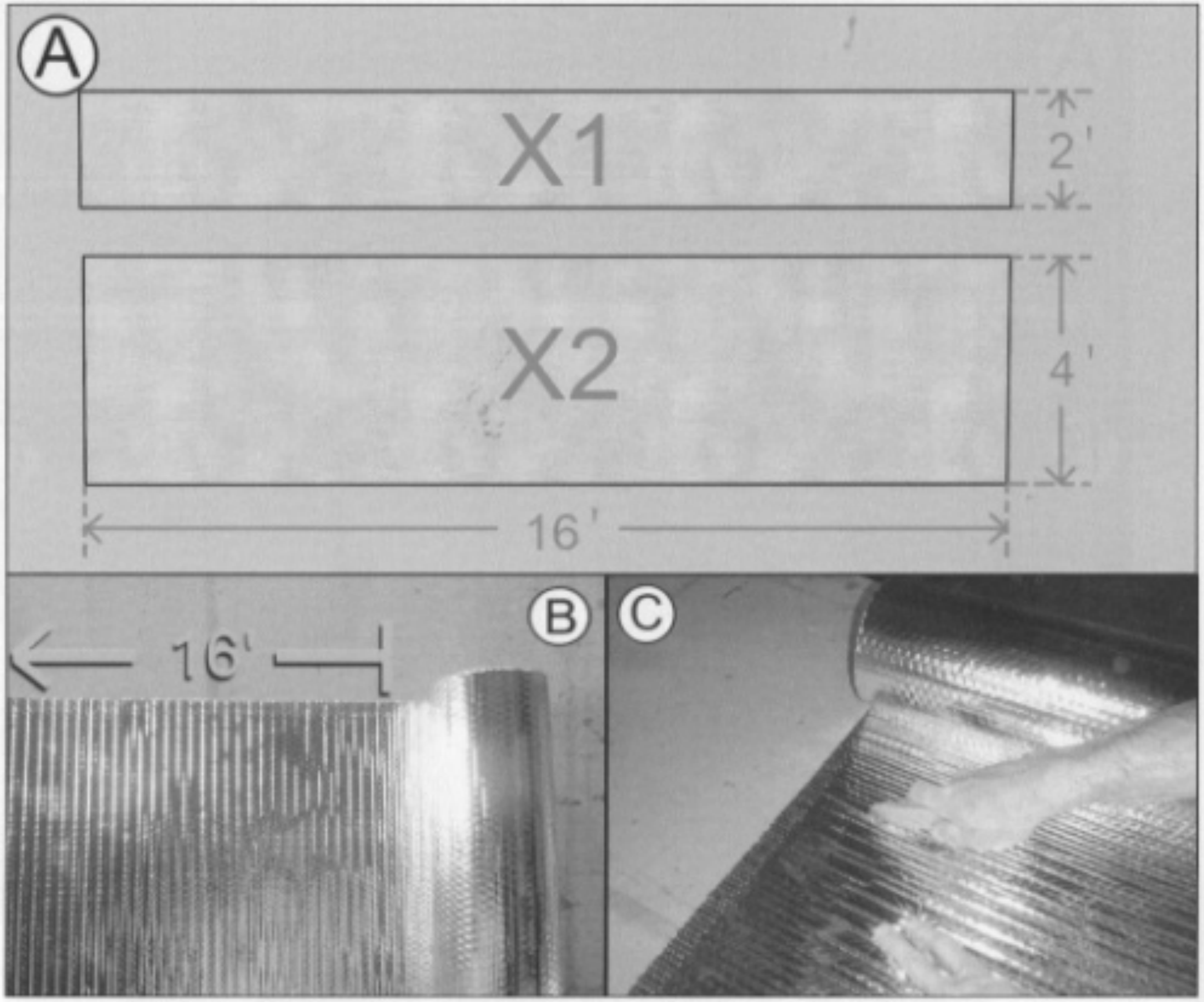



**Figure 11.** Measurements and steps for preparing the reflective layer of roof insulation

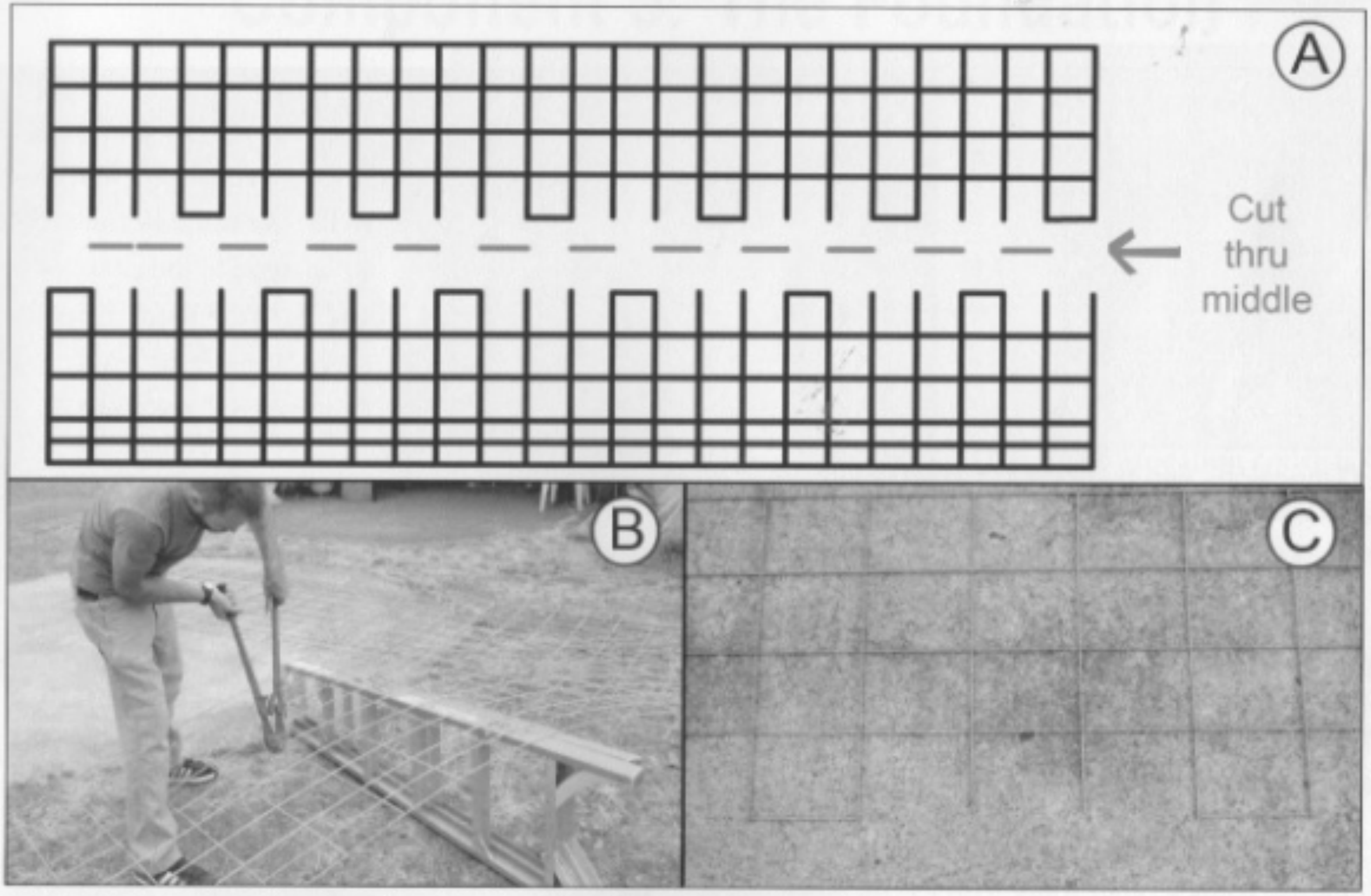



Figure 12. Images showing the process of cutting a cattle panel in half lengthwise

**Cattle Panel—Prep Work (fig. 12):**

Three-and-a-half 50"X16' cattle panels make up the roof structure. **Figure 12** shows how to cut the panel in half, because the full panels don't need any prep work. The red dashes (**fig. 12A**) are segments of the cattle panel that are cut out with bolt cutters (**fig. 12B**). Notice the edge of the panel after it is cut in **Figure 12C**. Some of the grid squares have an edge missing and some don't. Take your time with this step. You get a gold star if you get this right the first time!

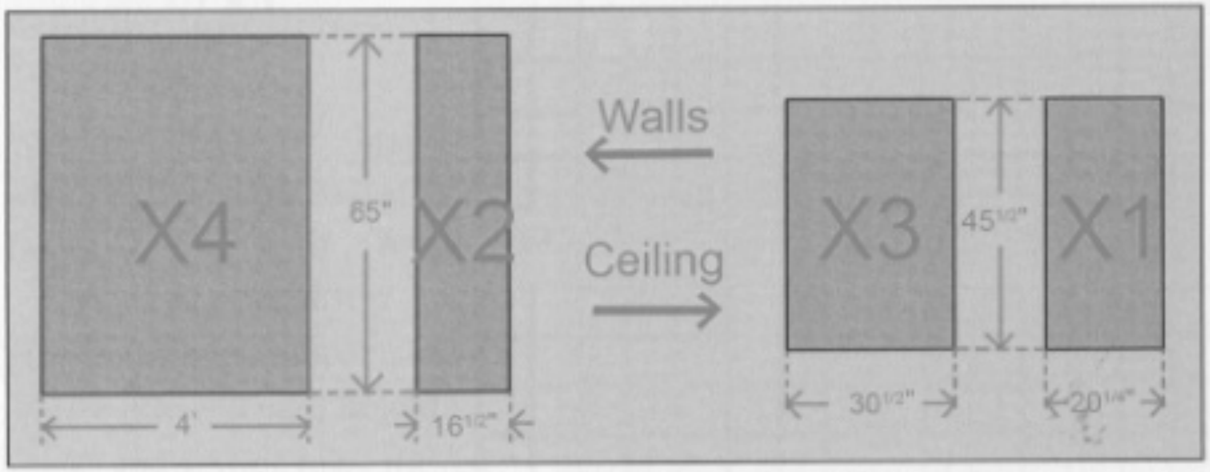



**Figure 13.** Dimensions and quantities of the 1" foam panels used to insulate the interior of the Hut

**NOTE:** R-Tech wall insulation is not conventionally used as interior walls. We use it because of its ability to bend to the curve of the walls and provide extra insulation. For more important information on this material, see page 77.

### R-Tech Interior Insulation—Pre-cutting:

**(1)** Study the dimensions and quantity per Hut (in red) illustrated above in **Figure 13.**

**(2)** Cut the insulation pieces out of five 4'X8'X1" R-Tech panels using a razor knife with a long blade and a straightedge (**fig. 14**). Aluminum tape is used on the seams of the foam panels once installed in the Hut. Cutting the panels can be done with a table saw if you are comfortable using one. It will make a mess of many small Styrofoam particles ripping it with a table saw, but it goes a lot faster if you are producing many Huts.

**Figure 14.** Cut the foam panel with a razor knife with a long blade and a straightedge.

# Component 5: The Foundation Pieces

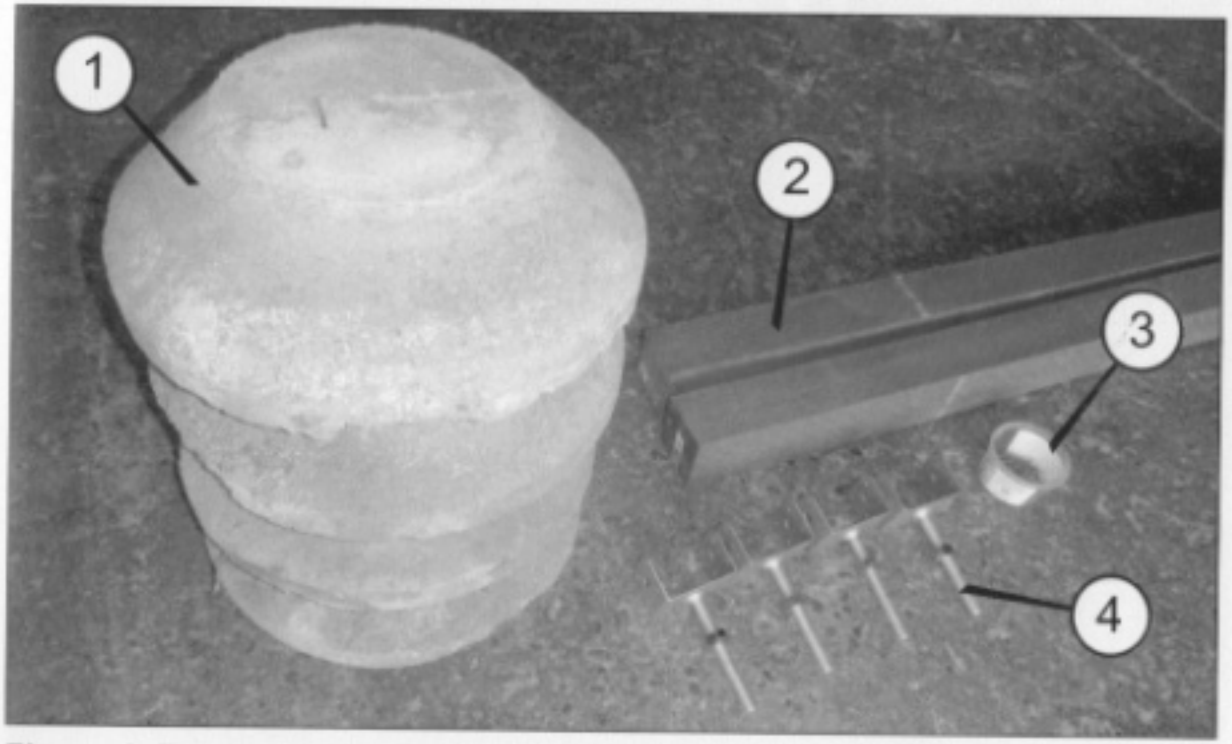



**Figure 1.** The pieces that make up the foundation

No prep work is needed on the foundation pieces besides gathering them up. See the assembly section on pages 41 and 42 to see how they go together.

### MORE INFORMATION ABOUT THE FOUNDATION MATERIALS

**(1)** The foundation consists of 4 cement pier blocks that go directly on the ground. We use 18" remodel pier blocks, which are 6" tall, 18" in diameter at the base, and 10" in diameter at the top. But you can also use any standard pier block.

**(2)** The 4"X4"X10' beams support the Hut floor.

**(3)** Short exterior deck screws. These are used for attaching the 4X4s to the brackets.

**(4)** These adjustable galvanized 4X4 brackets rule! They attach the beams to the blocks and have a threaded post with a big nut that raises or lowers the beam height to level the foundation with ease—no moving around the heavy blocks or scraping the earth with a shovel.

*Names of foundation pieces*

1. Pier blocks: 4
2. 4X4s: 2
3. 1¼" exterior screws: a handful
4. Elevated post base brackets: 4

# SECTION THREE:

# PUTTING THE HUT TOGETHER

**The seven major steps to assemble the separate components into one complete Conestoga Hut.**

# Introduction: Getting to the Build Site

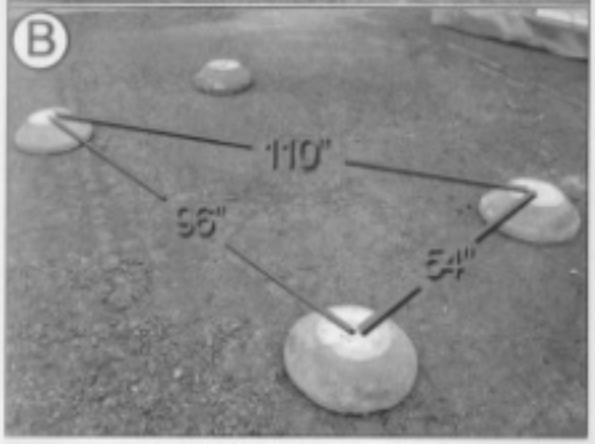
Figure 1. Wall components ready for delivery in the back of a Chevy S-10 truck

Figure 2.

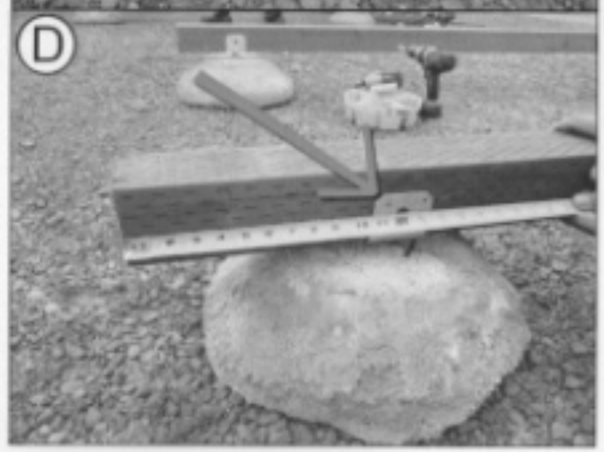
One of the most important, and difficult, stages of assembling Conestoga Huts is making sure all the components and tools necessary to finish the structure make it to the build site. We've had many trial-and-error experiences with this process, and after more than 100 Hut builds we still breathe a sigh of relief when we don't have to go back to the shop for that one forgotten piece. To help us succeed in this task we developed checklists (see pages 78 and 79) for materials and tools to guide us as we prepare to load them. Of course, it is always easiest to build Huts where your shop is located near the build site and not across town.

This manual doesn't present an exact process for how to load up the tools and materials. In the past, we used, almost exclusively, a small Chevy S-10 pulling a 6' X 10' flatbed trailer. With this, we hauled all the tools and materials to build one Hut. It did take some creative packing to fit it all, so our Hut building volunteers helped by taking some of the smaller items. **Figure 1** shows our small truck with two sets of walls (two front panels, two back panels). Now, we use a 7'X16' trailer behind a full-size pickup **(fig. 2)**. Volunteers help with the loading, following a process that we are continually refining, and still transport some items.

# Step 1: Laying Down the Foundation


Roughly lay out the foundation blocks. If you are building on a slope you may need to dig down some at the highest points so the finished Hut does not sit too high above the ground. CSS uses 18" round "remodel" blocks because of their low height. but any block will do as long as it has a hole in the top to receive an adjustable pier bracket. **Step 1A**: Volunteers use a wooden rectangular frame that helps lay out the blocks accurately and efficiently. Holes in the plywood triangles correspond with the holes in the blocks. If you look closely, you'll see that the volunteer in the flannel shirt is inserting a screwdriver into the holes to check the alignment of the block to the wooden frame.


**Step 1B**: Check the measurements for the spacing of the holes in the blocks, as shown. The diagonal measurements should match, indicating that your foundation blocks are squared.

**Step 1C**: After the blocks are set in position, we insert the adjustable brackets into them. A large nut on the bracket adjusts its height (see page 37 to get a better look at the nut). We position it as low as possible because we try to keep the Hut as low to the ground as we can to make it easier to step into. **Step 1D**: Place the 10' 4X4s into the brackets. The end of the 4X4 should be 1' away from the center of the foundation block, so measure 1' from the end of the 4X4 to the big hole in the adjustable bracket.

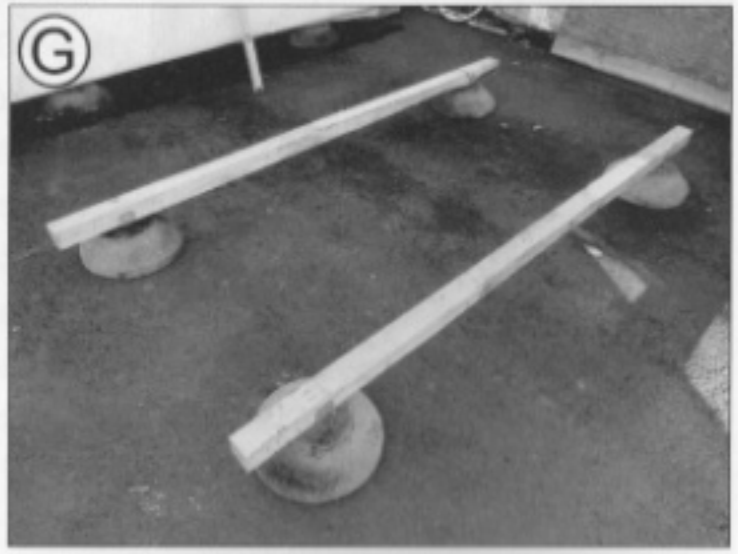


Leveling the 4X4s is made easy by adjusting the pier brackets. If you can tell which pier block sits highest on the ground, start there with the bracket adjusted all the way down.

**Step 1E**: Start by leveling the 4X4 in the highest corner directly across to the other 4X4, using a 6-foot level or a shorter level with the rectangular frame or a board long enough to reach across.

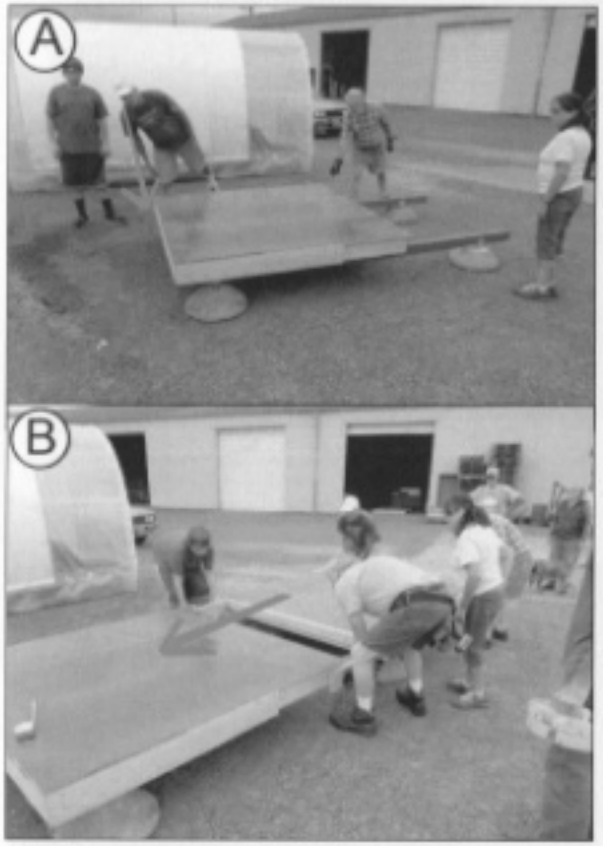
**Step 1F**: Then level each 4X4 from the corners where you started to the opposite end. Check to make sure the 4X4s are level to each other at the end away from where you started. They should be.

**Step 1G:** You can use two 1 1/4" exterior deck screws per side to hold the position of the 4X4 beam in the bracket. Now you are ready for the next component!

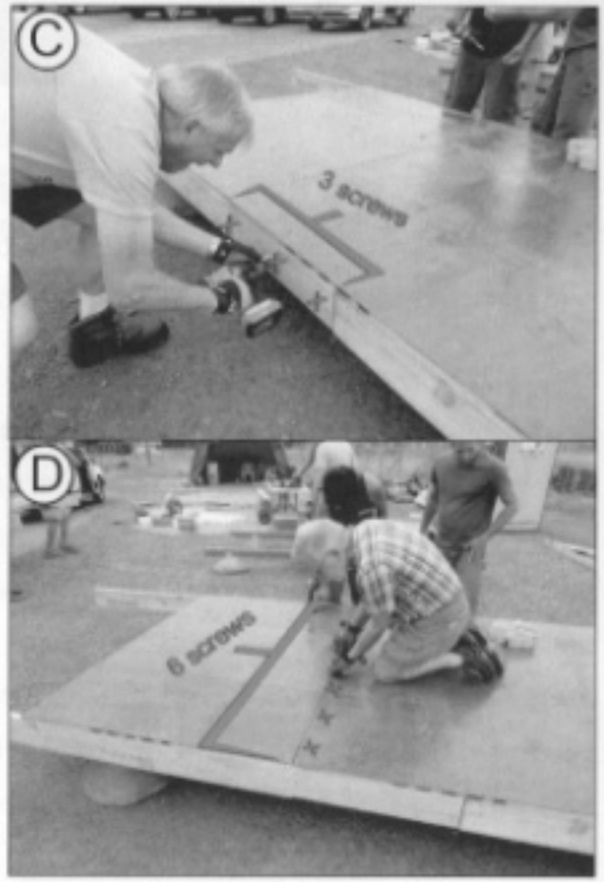


# Step 2: Assembling the Floor Component






**Step 2A**: Carry the rear floor section and set it down on the leveled 4X4s. Look to ensure that the backside of the section is flush with the end of the 4X4s beneath it. **Step 2B**: The front floor section inserts into the rear floor section. During this process the rear section may be jostled a bit. You can fine-tune the orienting of the floor on top of the 4X4 foundation beams once the two sections are fastened together.




**Step 2C**: Using three 3" deck screws, attach the 2X6 overlapping the rear section (in the picture look at the Xs). This will begin to connect the two sections together. **Step 2D**: Next drive six 2¼" deck screws through the plywood of the rear section into the 2X4 ledge that is part of the front section. Take time to ensure the screws are going into that 2X4. (See **fig. 5** on page 14.)

To finish the assembly of the floor component: Nudge the floor, as a whole piece, until the sides of the floor are the same distance from the sides of the 4X4 beams (≈7¼") and the rear of the floor is flush with the 4X4s underneath. You can also "toenail" screws from the 4X4s up into the floor joists if you want to attach the floor to the foundation.

# Step 3: Setting Up the Wall Components


**Step 3A**: Carry the walls to the Hut site and stand them on the floor close to their final position with the temporary wall footer still in place. Remove the screws and washers that are holding the temporary footer. Lift the wall off the footer, remove the footer, and set the wall down in place on the edge of the floor.

**Step 3B**: Using 2¼" deck screws, attach the plywood overhang at the bottom of the wall component to the floor component. *Repeat this process for both the front and back walls, but only use the washers on the back wall.*

Even though the 2X4 wall braces (page 33) are parts of the roof component, we install them as a wall component because they give extra support to the walls.



**Step 3C**: Insert the 2X4 wall braces into the slots near the top of the wall panels. To do this, cut the wall-end material with a razor knife, peel it back, and drop the 2X4 into the slot. The lath strips attached to the 2X4s face toward the outside of the Hut and the longer overhang (without the lath strip) goes to the front. Hold the walls plumb and use 3" deck screws to attach the 2X4s to the walls, screwing from the outside.


**Step 3D**: Notice the board that is temporarily attached to the inside face of the front wall panel. Its purpose is to hold the proper spacing of the door opening when the temporary footer gets removed. Preserving the width of the door opening is critical to maintaining a door that opens and closes easily. You can take this board off after the wall is attached to the floor component.


**Step 3E**: Tape up the wall-end material where it was cut, and you are ready to move onto the next step. Keep in mind that the walls will still move forward and backwards a little, so they are not ready for you to lean up against them and take a break.

# Step 4: Deck Assembly



The deck can be installed once the front wall of the Hut has been positioned, plumbed, and secured to the wall braces.

**Step 4A**: Begin by removing the rear deck joist from the rest of the deck assembly. This joist should have five pre-drilled and countersunk holes. **Step 4B**: Mark 1¾" below the door trim on the front wall and place the joist at that point, between the Hut floor joists, which extend out from the front of the Hut. Secure it with one 3" deck screw.

**Step 4C**: Level the joist and finish attaching it with four more deck screws.

**Step 4D**: This joist (which has now become a ledger board) along with two preinstalled blocks on the Hut floor joists will form the support for the deck.



**Step 4E**: Lift the deck and slide it into place onto the ledger board and the two support blocks. It should slope slightly away from the front door, allowing water to drain.



**Steps 4F** and **4G**: Using the pre-drilled holes in the deck boards, secure the deck to the ledger board, using two screws per board.


**Step 4H**: Drive deck screws in from the sides, to secure the Hut floor joist to the remaining two deck joists (three screws per joist on each side).

****CAUTION** DO NOT ALLOW ANYONE TO STAND ON THE DECK UNTIL THE INSTALLATION IS COMPLETE!!**

**Step 4I**: Measure from under the bottom of the front deck joist to the ground or to support blocks if any are being used. **Step 4J**: Transfer that measurement to the shorter side of the support legs. **Step 4K**: Cut the legs to the correct length with a saw. **Step 4L**: Position the legs under the third deck board from each end and secure to the front joist using two deck screws.





**Step 4M**: The deck assembly is now complete and can be walked on. If you are concerned about the finished appearance, cover it with a small tarp to keep it clean while people access the Hut for interior work.


**NOTE:** If Hut is being placed on soft ground, it is better to cut the legs about 1/8" longer to account for settling, which will occur from stepping up and down on the front deck.

# Step 5: Fastening the Roof Component (Part 1)



**Step 5A**: A volunteer fastens down the stained or treated 2X2s that run the length of the interior of the Hut. These pieces sit flush to the edge on each side of the floor and serve as a base for interior insulation.

**Steps 5B**: Volunteers fasten tarpaper strips to the walls with a staple gun. The strip is wider than the wall and is set flush to the outside edge of both wall panels. It prevents condensation from dripping inside the structure.

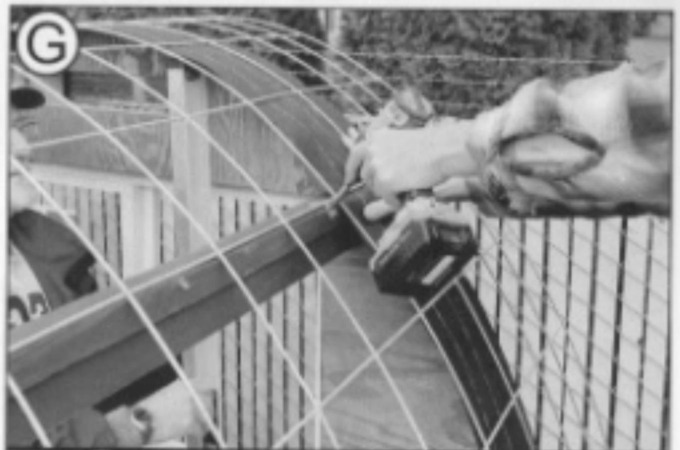

**Step 5C**: Now we begin putting the cattle panels into place. Chalk a line $2\frac{3}{8}$" from the bottom of the 2X6 floor joist on one side to use as a guide.

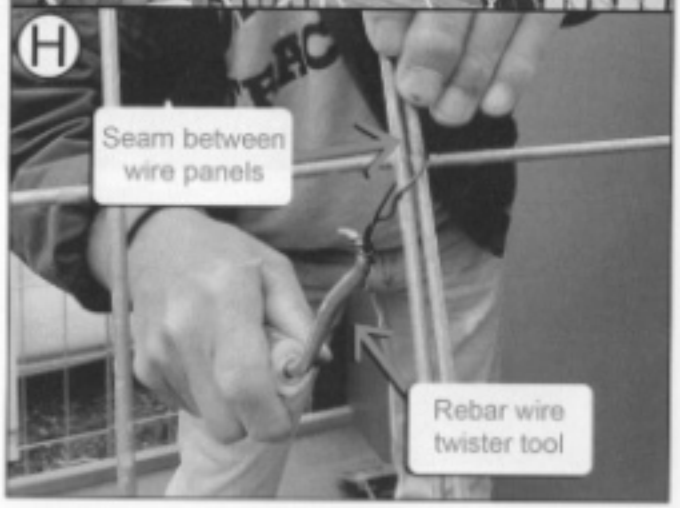

**Step 5D:** The panels can be moved with two people walking together, holding the panel in an arched position. Start at the back of the Hut. The first panel is the most important to get right. Here are important guide points to follow while positioning your first panel: **(1)** The long vertical wires of the panel should be facing up and the short horizontal wires should be facing down touching the Hut. Also, the long vertical wires should be parallel to the rear wall edge **(2)** Set the bottom of one end of the panel along the chalk line. **(3)** The panel should overhang the 2X4 wall braces by about 1". **(4)** On both sides of the Hut, a horizontal wire should be running along the outer edge of the 2X4 wall brace (see page 52, fig. 5I for more detail).

*By following the points above you should end up with the panel setting symmetrically on the Hut structure.*

**Step 5E**: Once the panel is in a near-perfect position, hold it while volunteers use the plumbers tape fasteners and 1 ¼" deck screws to attach it to the side with the chalk line first. Then do the other side. For starters, just put four or five fasteners into the 2X6 floor joist, along the bottom only. You will fasten the other points later. **Figure 5F** shows a close up of the fastener being attached with the bottom of the cattle panel lined up with the chalk line.

**Step 5G**: Okay, with the bottom secure, we recheck to make sure the rear wall is plumb and fasten the panel to the 2X4 wall brace close to the wall to hold it plumb. Then it's time to get and fasten another panel, and then another, and then a half panel (see **fig. 5K**). Each new panel should be brought over the front of the Hut toward the rear and fastened first to the bottom following the chalk line.






**Step 5H**: As new panels are being fastened, a volunteer can begin tying the panels together with the rebar ties using the twister tool. We use seven wire sections per seam.



**Step 5I**: Fasteners should go in every other space along the wall braces.

**Step 5J**: Also fasten the brackets along the top edge of both walls with screws into the wall blocks, which are located by finding the heads of the screws holding them to the plywood interior sheathing. Put a bracket at every block.

**Figure 5K**: This is a closeup detailing the orientation of the fourth cattle panel (the half panel). Notice that the cut end is positioned next to the third panel and not at the front of the Hut.

**Figure 5L**: Now you have all of your roof structure in place and you can start adding insulation to it.


# Step 6: Roof Component (Part 2)—*Insulation*



After the cattle panels have been securely fastened to the wood frame you are ready to put in the interior insulation. The foam insulation panels fit snuggly into the structure and can be somewhat delicate, so don't hurry it.

**Step 6A**: The first panel is placed by inserting it into the top space behind the 2X4 wall brace. **Step 6B**: Then, push the foam panel gently near the bottom toward the cattle panel and lift it on top of the 2X2 fastened to the floor. Repeat this process for all the other insulation panels.

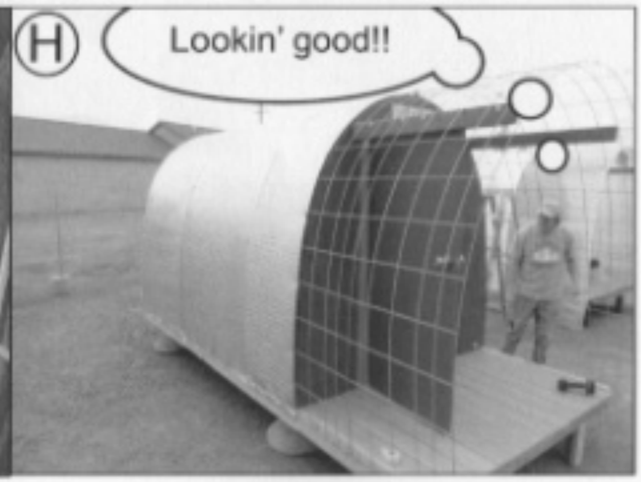
**Step 6C**: Insert the foam panels into the ceiling area. *Be very careful inserting these panels because they are TIGHT!* And, actually, we want them snug. **Step 6D**: Gently work the panel into the space. The gap between the insulation and the cattle panel should be about ¾" to 1". Also keep in mind that you want NO or very little gaps anywhere on the inside space. After installing all of the foam panels, tape the seams between the panels with 2" aluminum ducting tape.


**Figure 6E**: A view from outside the Hut looking at the installed foam insulation. Notice how snug the panel is to the cattle panel! **Step 6F**: Attach the outer reflective insulation over the entire *interior* space (which is 10' in length from the outside of the back wall to the outside of the front wall). Throw the roll of insulation over the Hut, attach it with T-50 staples on one bottom end, pull it tight and fasten it to the other bottom edge with more T-50 staples. *Make sure to pull it taut before fastening.*



**Step 6G**: We also staple the exterior insulation to the blocks along the wall-ends to squeeze it into the wall and reduce the gap between the insualtion and the wall.

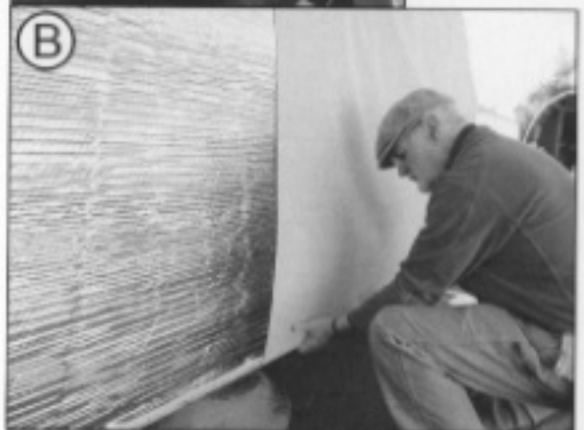
**STEP 6H**: Ready to move onto the next step!

# Step 7: Roof Component (Part 3)— *Roof Membrane Installation*

For the roof membrane we use thermoplastic polyolefin (TPO) over the interior and vinyl fabric over the deck and rear overhang. TPO is a single-ply reflective roofing membrane. Combined with the vinyl material, it offers a long lifespan, good insulation value and protection of the Reflectix insulation, and low maintenance. (For more info on these materials see page 74)

**Step 7A**: Volunteers unroll the vinyl material over the front and rear of the hut.



**Step 7B**: Pull one side of the fabric so it wraps neatly under the floor framing for fastening (the finished side) from below. Let the other side run long. It will be cut later. The vertical edge of the material should extend about 1.5" to 2" beyond the outside edge of the cattle panels (porch and rear eave).

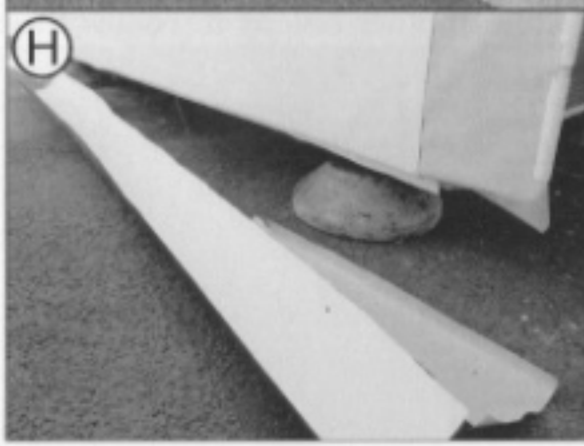
**Step 7C**: Fasten the finished side with the 1" hex roofing screws, from underneath up into the 2X6 at the edge of the floor framing. Fasteners should be about 6" apart. Have one person keep the material straight and taut, while another fastens it. Follow the same procedure on the other side.

**Step 7D**: Fold the vinyl material over the edges of the cattle panel and attach the PVC saddle clips. It's a bit tricky sometimes to get the PVC clips on, but with persistence anything is possible. The clips go all the way around the cattle panel to give the edge a clean finished appearance. (This step can also be done after 7E.)



**Step 7E**: Unroll the TPO over the interior portion. This usually requires three people, one on a ladder in the middle of the roll. Unroll enough of the material so the free end is near the bottom of the Hut. Then, working together, push the rest of the roll over the top (being sure to warn anyone on the other side!).

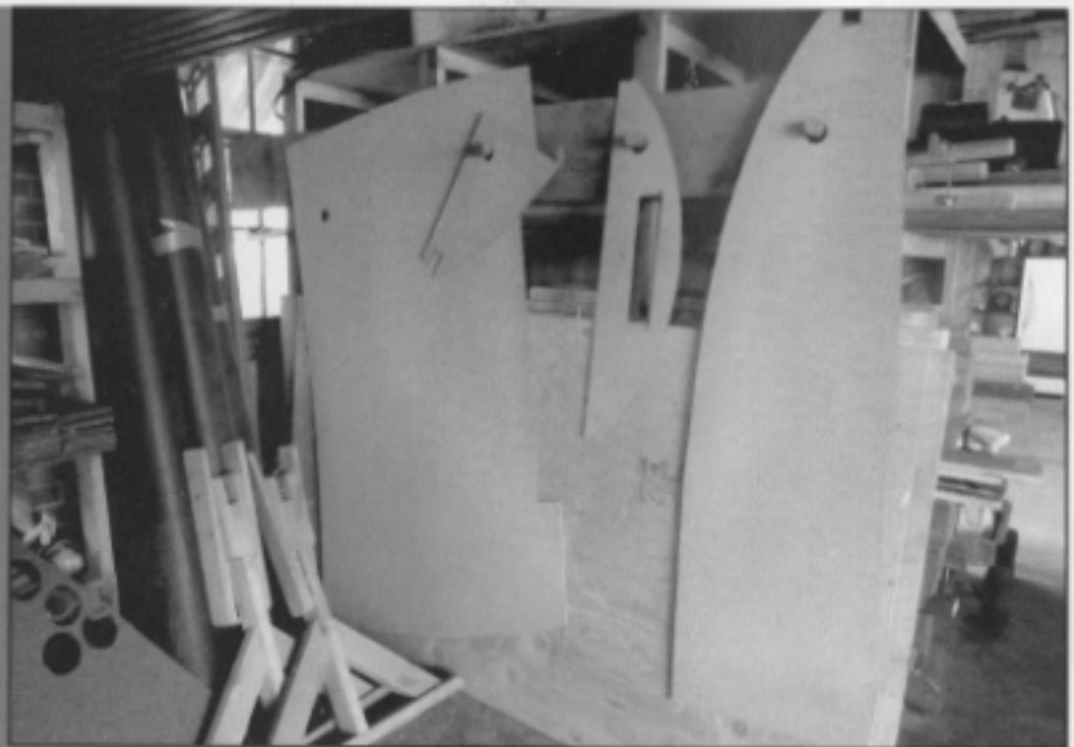
**Step 7F**: Follow a similar procedure as in **7B** to set one side at the finished length. Make sure the TPO is covering all the interior by measuring from the outside of the overhangs to the vertical edge of the TPO in both front and back. The desired measurements are approximately 44" in front and 10" in back. You can double check by measuring from the outside of the walls to the outside of the vinyl-covered cattle panel.


**STEP 7G**: Attach the TPO to the floor framing in the same manner as the vinyl (**7C**).

**STEP 7H**: Using a good sharp razor knife, cut off the excess material along the second bottom edge you attached, leaving enough to tuck neatly under the floor framing.


**STEP 7I**: Do a final clean up around the newly built Conestoga Hut. Look for any hardware or inconspicuously placed tools that might be left behind.



# SECTION FOUR:
# A FEW MORE DETAILS

**Patterns and jigs, bed frame, FAQ, and checklists**

# Building Patterns and Jigs

The term *building patterns* refers here to the patterns that you use to cut out the plywood wall panels. This is the skin of the interior and exterior Hut walls.

Constructing these patterns is a tedious process. To make them, mark out all the provided measurements and trace them by using a long strip of bendable wood (e.g. ¼" MDF board). If you are planning to make more than one Conestoga Hut, you won't regret making them. We recommend using a durable hardwood plywood if you plan to use the patterns again and again.

If you would like to fast-track the building process, you can purchase cardboard patterns from CSS to bypass all the tedious measuring.

### WJ1 (EXTERIOR/INTERIOR FRONT WALL)

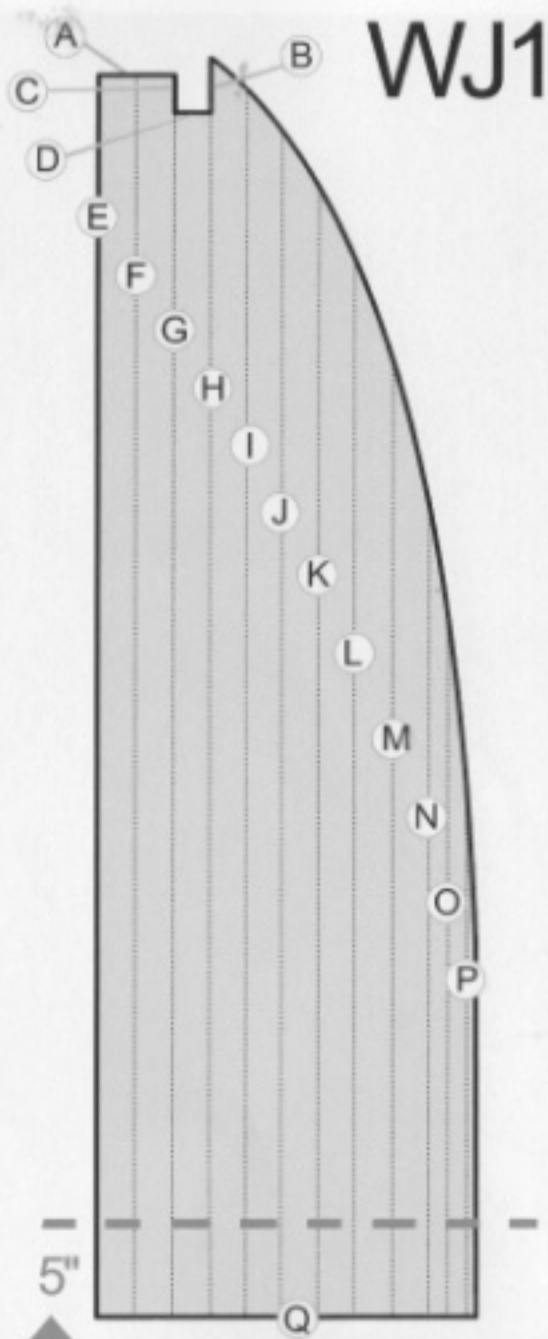
To use this pattern to make the INTERIOR WALL PANELS (front wall) you will cut 5" off from the bottom of the pattern (notice the red-dashed line in the illustration to the left).

A: 4 ¼"
B: 3 ¾"
C: 2 9/16"
D: 1 ¾"
E: 68 ⅛"
F: 68 ¾"
G: 68 ¾"
H: 69 15/16"
I: 67 ¾"
J: 64 ⅞"

K: 61 ½"
L: 57"
M: 51 ⅝"
N: 44 ⅛"
O: 38 ¼"
P: 29"
Q: 20 13/16"

Measurement between set of points: E-F, F-G, G-H, H-I, I-J, J-K, L-M, M-N is 2", in between points N-O, O-P is 1", and point P to the edge is ¾".

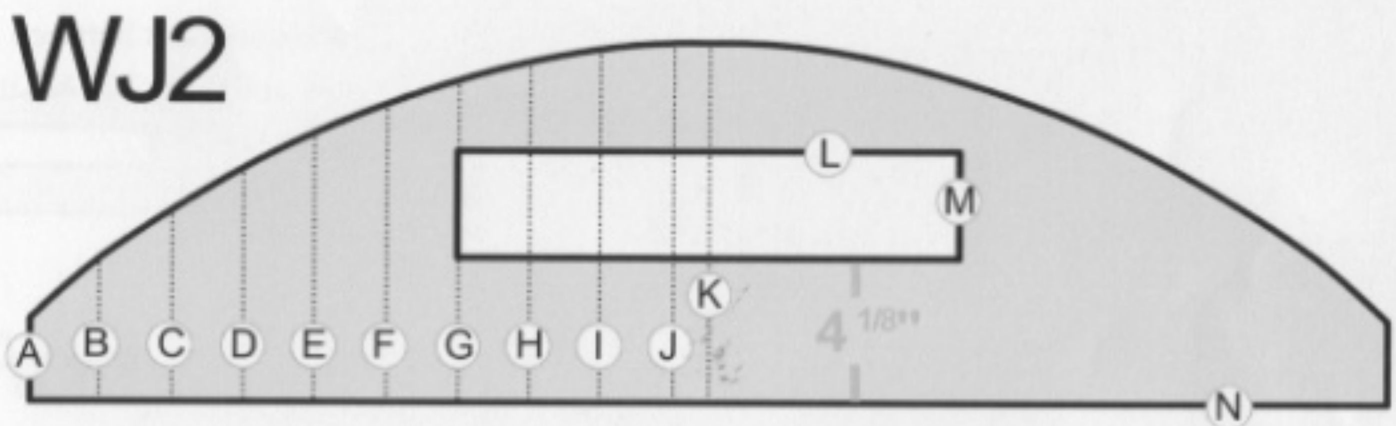
**NOTE**: This building pattern makes both the right and the left pattern. Just flip it over to make the opposite side.




Use the same pattern for the interior of the front wall, but remove 5" from the bottom.

## WJ2 (INTERIOR/EXTERIOR FRONT & BACK WALL)

A: 2 ⅞"
B: 4 ½"
C: 5 ⅞"
D: 7"
E: 7 15⁄16"
F: 8 11⁄16"
G: 9 5⁄16"
H: 9 ¾"
I: 10 1⁄16"
J: 10 3⁄16"
K: 10 ¼"
L: 14 ¼"
M: 2 ¾"
N: 39 ¼"

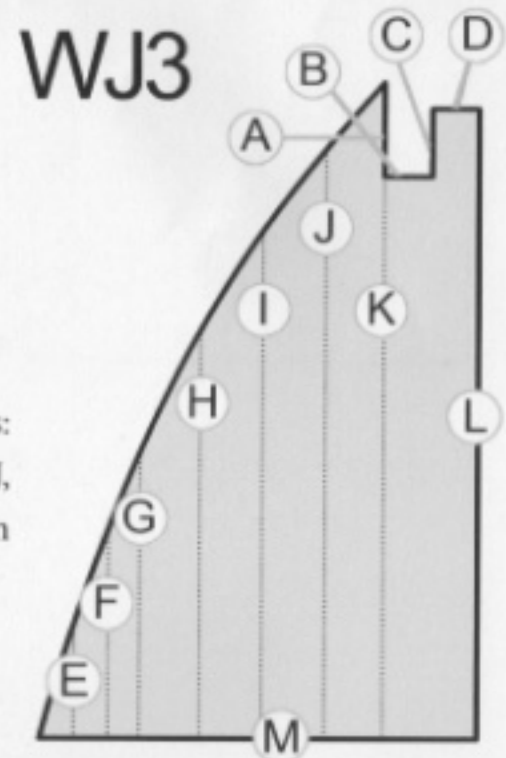


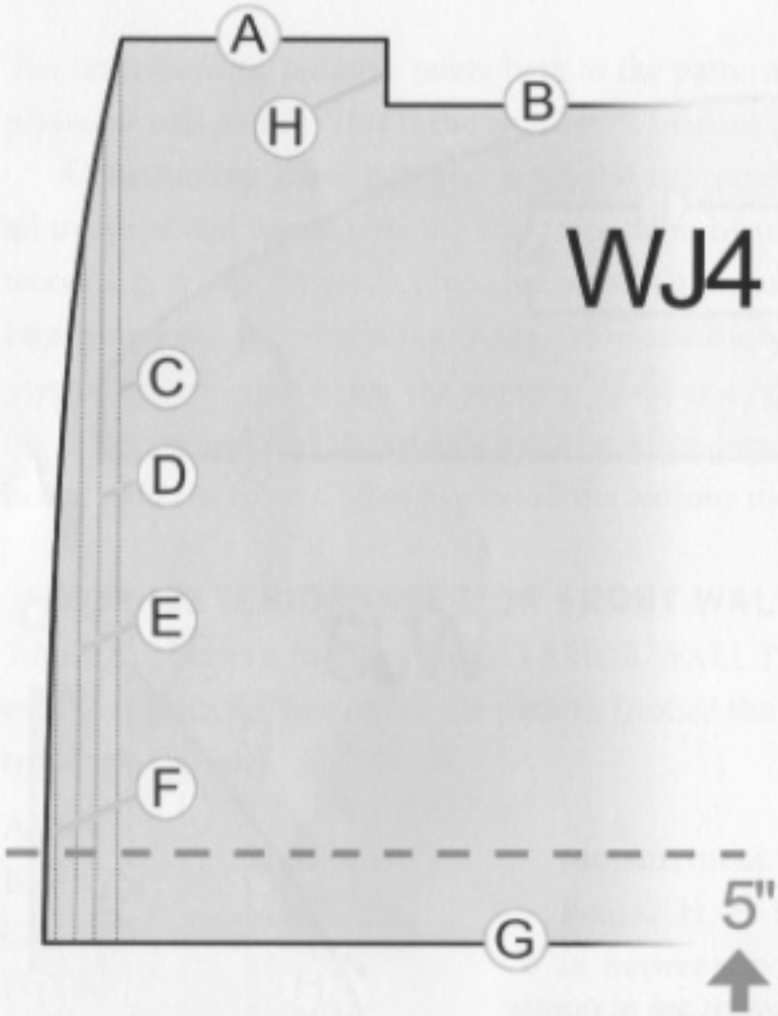

Measurement between set of points A-B, B-C, C-D, D-E, E-F, F-G, G-H, H-I, I-J is 2". Space between J-K is 1 ⅝".

## WJ3 (INTERIOR/EXTERIOR BACK WALL)

A: 3 11⁄16"
B: 1 ¾"
C: 2 ⅝"
D: 1 ⅜"
E: 4 ⅝"
F: 7 ⅝"
G: 10"
H: 14"
I: 17 ¼"
J: 19 15⁄16"
K: 22 ⅛"
L: 21 1⁄16"
M: 14 ⅜"

Measurement between set of points: L-K is 3 ⅛", in between points: K-J, J-I, I-H, H-G is 2", and in between points: G-F, F-E is 1".





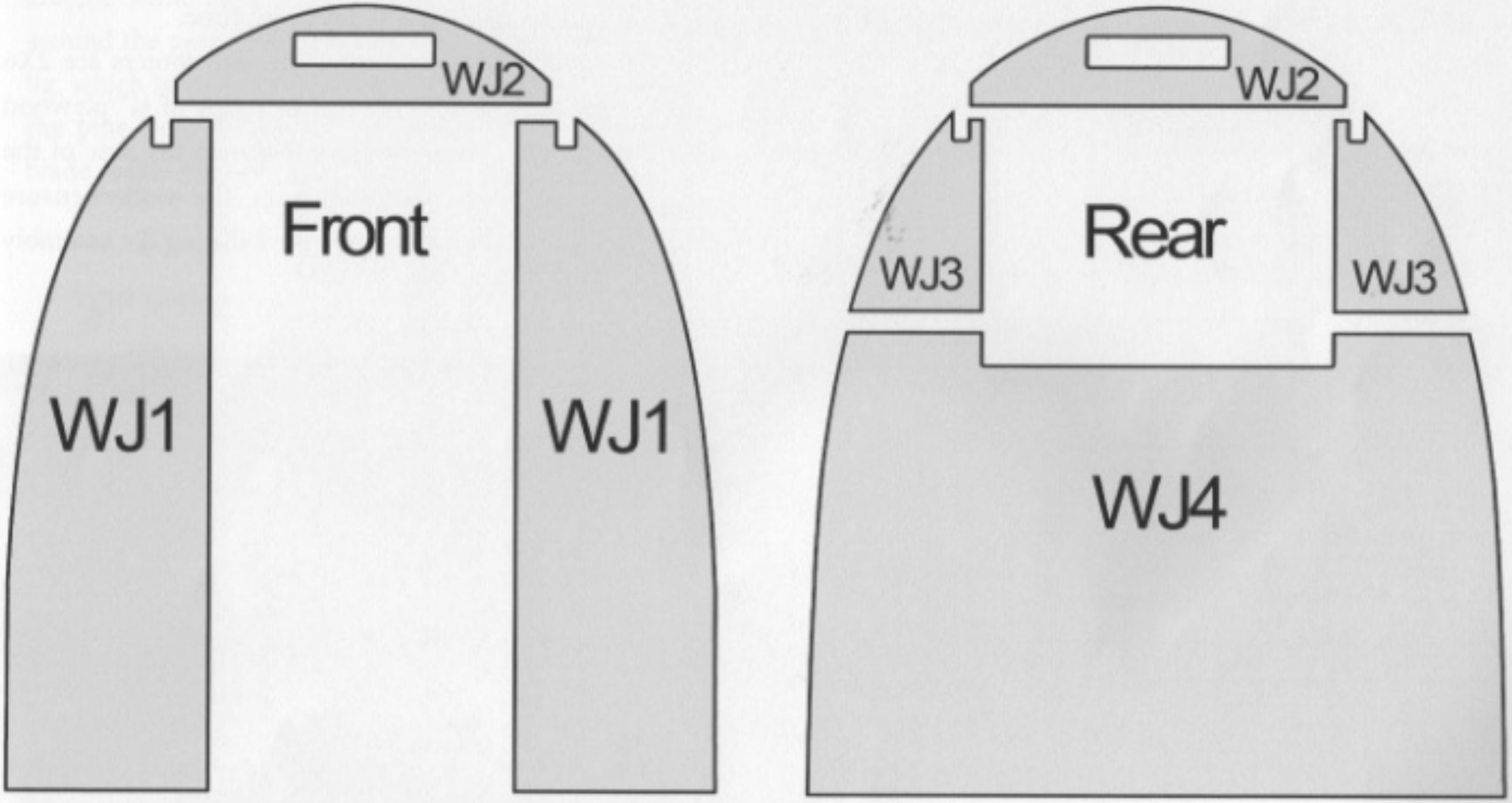

Use the same pattern for the interior of the rear wall, but remove 5" from the bottom.

## WJ4 (EXTERIOR BACK WALL)

A: 14 ½"
B: 36 ⅜"
C: 47 ¹¹⁄₁₆"
D: 43 ⁷⁄₁₆"
E: 37 ⅛"
F: 27 ¹⁄₁₆"
G: 72"
H: 3 ⁵⁄₁₆"

Measurement between set of points: the corner and point F is ¾", in between points F-E, E-D, D-C is 1".

To use this pattern to make the INTERIOR WALL PANELS (rear wall) you will cut 5" off from the bottom of the pattern.




Placements of the various wall patterns and how they fit together to make the wall panels.

## WALL FOOTER

The wall footer is a block of wood that is temporarily attached to the bottom of the wall components until they are attached to the floor component during assembly. Without it, the wall components would not be able to stand up on a solid bottom edge, making it difficult to work on. It is referenced in both the Wall Construction section on page 19 and during the assembly of the Hut on page 44.

**Figure 1** gives you the measurements you need to construct the wall footers. If you plan on building just one Hut, you would still benefit from building a set of these to assist you during construction and assembly. You need two (one for each wall component) for a single Hut. We have about 14 of these lingering around our shop because we have Huts in multiple states of assembly at any given time.

The wood used to construct the wall footers are 2X6 lumber sandwiched in between two strips of ¼" plywood (**fig. 2**). We fasten the temporary footer to the base of the walls using screws with added washers. The washers ensure the temporary footer is easy to remove during the assembly process (page 44, step 3A).

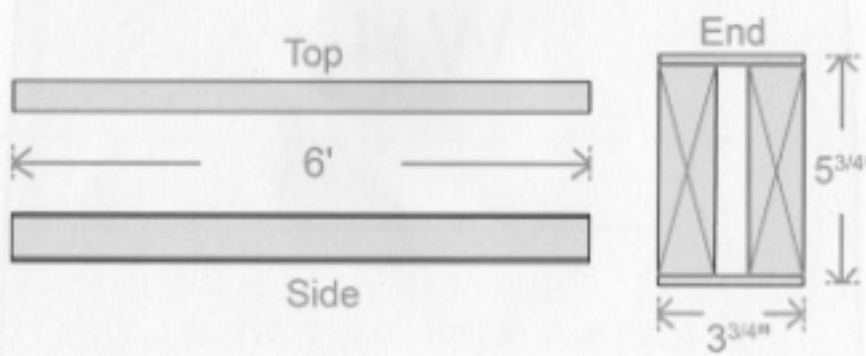



Figure 1. Dimensions of wall footer materials

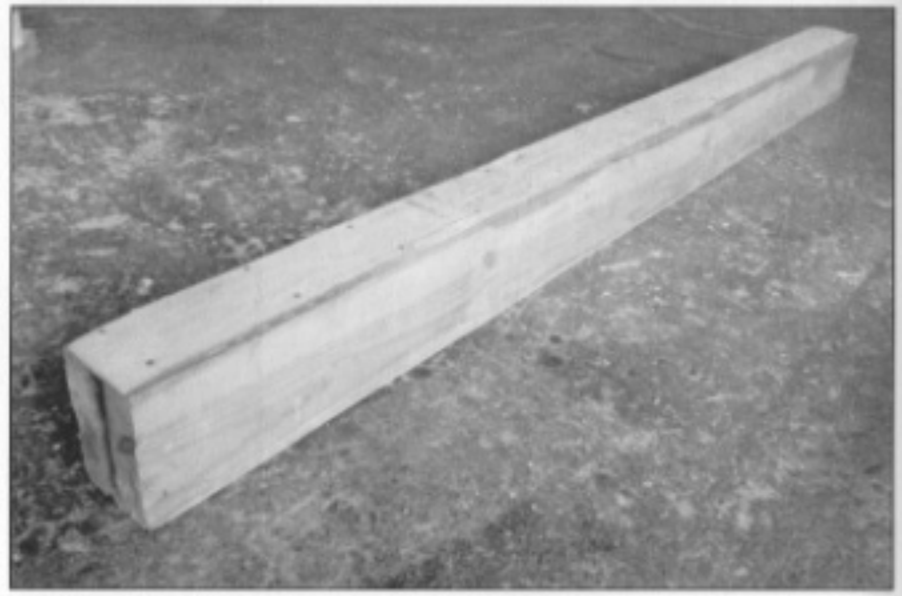


Figure 2. Finished wall footer

## PVC PIPE RIP JIG

The purpose of this jig is to provide a safe way to cut a slit into a PVC pipe to be used for saddle clips. The saddle clips are the white clips holding on the vinyl roof membrane around the perimeter of the arched roof (see page 55). The jig, which is made up of common scrap materials, prevents the pipe from wildly bouncing around as your table saw blade makes the open slit of the pipe.

The jig is clamped to a table saw fence (**fig. 2**) while the pre-cut 7" PVC sections, or a complete length of pipe, gets pushed through the blade. You need to adjust the jig's dimensions depending on the size of your table saw. The only dimension that is important to keep the same is the space that the PVC pipe is being inserted into (**fig. 1**).

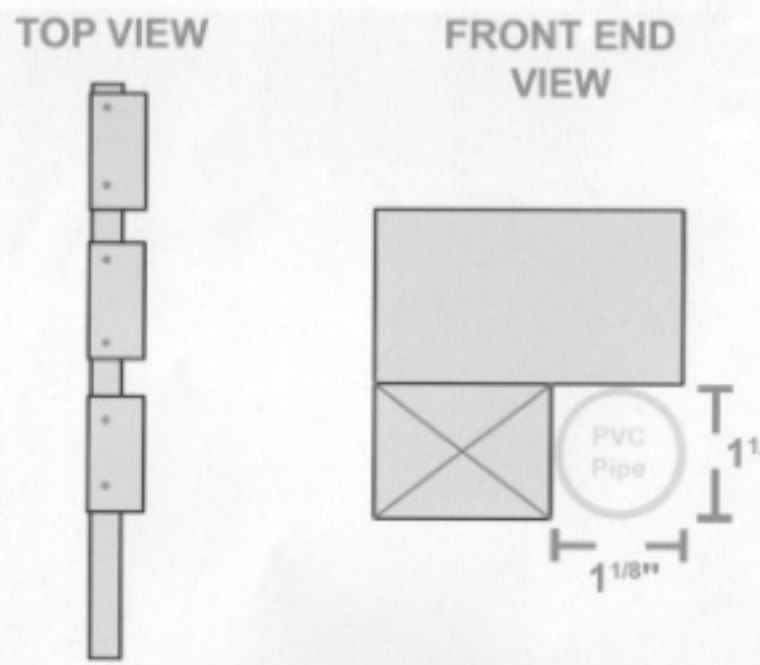



Figure 1. Assembly detail for PVC pipe rip jig


Figure 2. Jig clamped to table saw

## WALL STAND

This device holds a wall upright in order to install the door or window within a wall panel. Usually, we have one of these on each side of a wall for stability when working on it (see page 27, **fig. 5**). To insert a wall into the arms you loosen the pivot bolt until you can insert a wall component between the arms, and then you tighten the bolt back up. To prevent scratches to the wood paneling there is carpet glued to the insides of the arms that hold the wall upright.

## WALL JIG TABLE

This large jig is used to construct the basic frame of the wall components. Again, if you are only making one Hut, don't bother with this jig. The wall jig table allows us to construct many wall frames fast and accurately.

We initially make one finished frame very meticulously, place it on a 6'X6' table surface (**fig. 1**), and screw down a few wooden cleats around the outside of the frame. When the initial frame—we call it the Mother—is removed (**fig. 2**), the fastened down cleats remain to define the placement of the individual framing members for the next wall frame. Makes things go fast, breezy, and easy!

Figure 1. Wall frame positioned on jig table

Figure 2. Cleats in place to outline additional wall frames

## FOUNDATION BLOCK LAYOUT JIG

This jig comes in handy for laying out the blocks if you are assembling more than one Hut. If you are only doing one Hut, and that is all you ever plan to build, you can ignore this jig because it is not that necessary for only building one Hut.

The layout jig is made from 2X2s and a few pieces of scrap ¾" plywood. **Figure 1** shows the measurements to construct the frame of the jig. The plywood triangles in the corners don't really need to be any specific dimensions, they just need to be right triangles. But, keep in mind, the larger the triangles the more rigidity and strength your jig will have. Also, notice the ¼" holes in the corners of the triangles. These holes are used to pinpoint the location of the foundation blocks (see this procedure on page 41). **Figure 3** shows the location of the hole, which is right at the inside corner of the 2X2 frame.

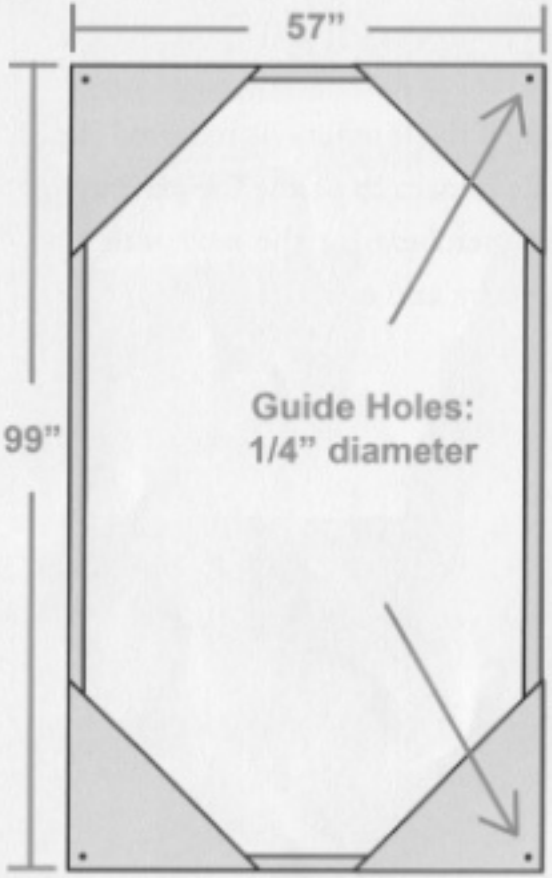



**Figure 1**. Dimensions of the foundation block layout jig. The guide holes are lined up with the hole in the center of the foundation blocks to determine their location.

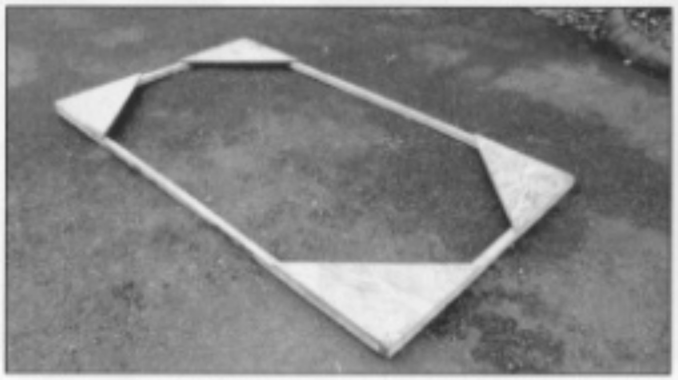


**Figure 2**. A completed foundation block layout jig

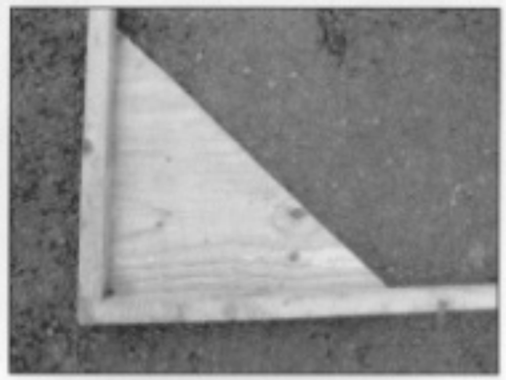
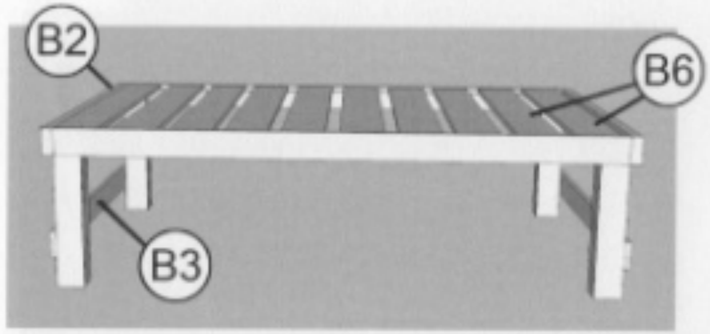
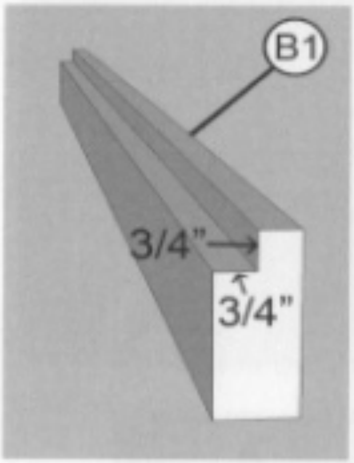


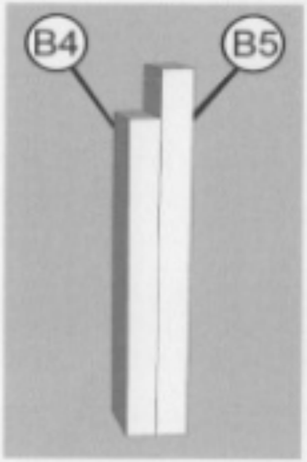
**Figure 3**. The reverse side showing the ¼" guide hole for determining the exact placement of the foundation block

# Conestoga Hut "Single Bed"






This bed frame is designed for a standard twin-sized mattress with no box spring. It is high enough off the ground to provide adequate storage of belongings in plastic totes. We paint two coats of water-based urethane on the bed slats (**B6**) to prevent mold issues where the mattress comes into contact with the bed frame. Providing open spaces between each slat allows the underside of the mattress to breathe, also helping to prevent mold.

***Measurements***

| Piece | Material | Length | QTY |
|---|---|---|---|
| B1: | 2X4 | 72" | 2 |
| B2: | 2X4 | 39" | 2 |
| B3: | 1X4 | 39" | 2 |
| B4: | 2X4 | 17" | 4 |
| B5: | 2X4 | 19⅝" | 4 |
| B6: | 1X6 | 37⅜" | 10 |

Assemble with 2" and 3" deck screws.

# Conestoga Hut "Double Bed"

While the Huts are of a very modest size for an individual, the Huts can also accommodate sleeping couples. To make the bed space larger, our team has developed an add-on frame to the single bed design (**fig. 1**). This frame is overall ¾" shorter than the single bed frame and gets attached to the single bed frame with 3" deck screws.

The frame can be covered with either ¾" plywood or 1"X6" slats like the single bed frame uses (**fig. 2**), except screws would need to hold the slats in place since there is no groove. When your top surface material is attached, it will be level with the single frame. I prefer to use the slats to help encourage airflow under the mattress and prevent mold issues.

With the add-on the Hut has the ability to accommodate a full size mattress: dimensions: 54"X75" (**fig. 3**).

***Measurements***

| Piece | Material | Length | QTY |
|---|---|---|---|
| B7 | 2X4 | 16 ¼" | 2 |
| B8 | 2X4 | 18 ⅞" | 2 |
| B9 | 2X4 | 11" | 4 |
| B10 | 2X4 | 75" | 2 |

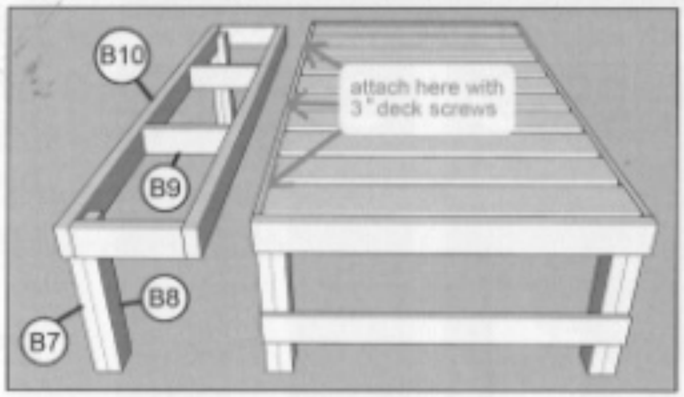



**Figure 1.** Add-on frame for double bed

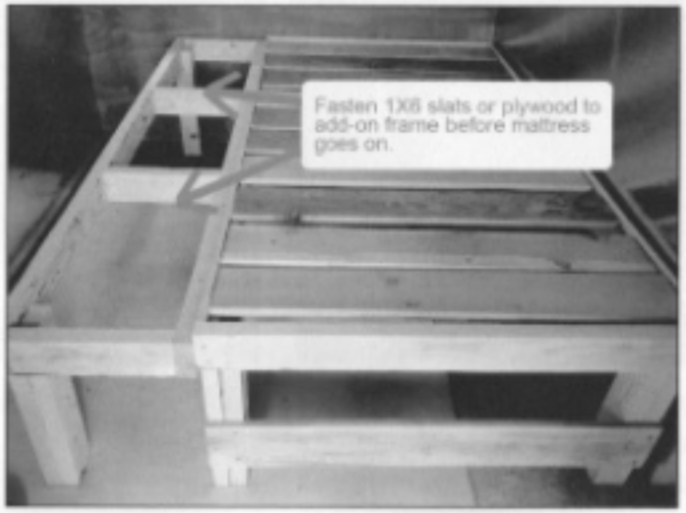
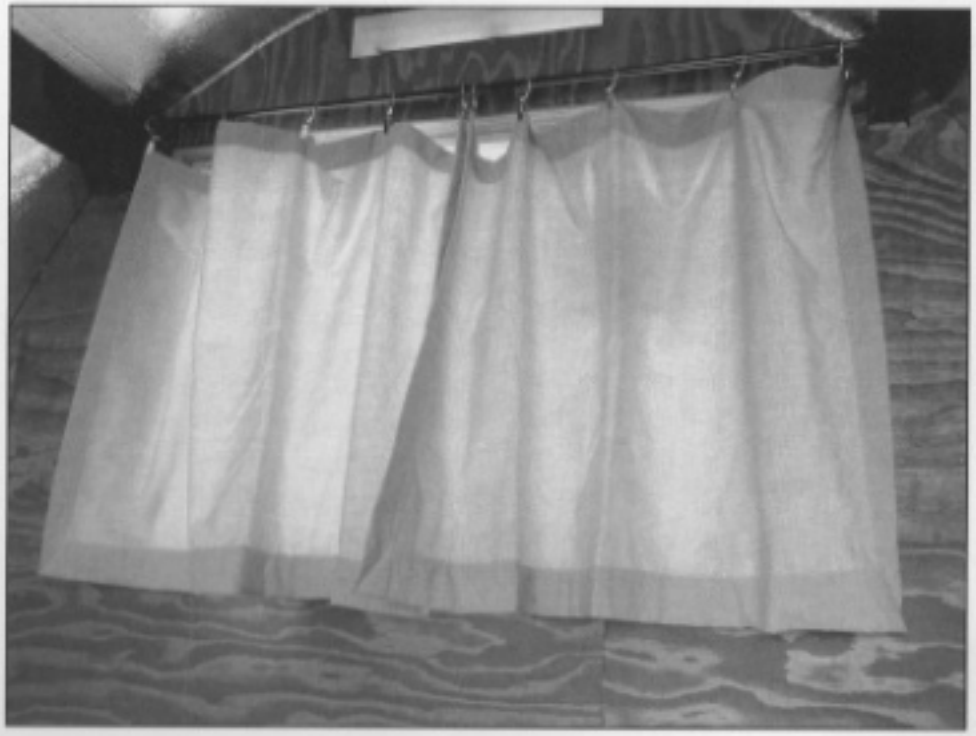



**Figure 2.**

**Figure 3.** Inside a Hut occupied by a couple

# Window Curtain



A functional window is not complete without a window curtain, which also keeps the inside of the Hut a little warmer. We get scrap fabric from a variety of venders and have developed a small team of people who have extra time to get out their sewing machines to produce the curtains. The curtain rod is a simple, inexpensive expandable rod from a hardware store that the Hut crew installs during assembly on site.

We use clip-on rings, rather than sewing a loop in the top edge of the curtain fabric, to connect the curtain to the rod. The problem that we have experienced with using loops sowed into the fabric is the curtains don't open as well.

The curtains add a very homey touch to the finished Conestoga Hut and give the Hut dweller some much needed privacy!

# The "Final" Step

It might not be your actual final step. Regardless of when you place it on the ground, it is an important, simple, and, for some people, a crucial accessory. This little step (**fig. 1**) makes it much easier to safely get onto the porch to enter the Hut . . . now, just remember to duck when going in the door!

The steps are made from shorter 2X6s (around 18"–36") we can scavenge from around our shop. We place two 2X6s on edge and fasten 3–4 more onto the top to make a simple step.

But this step doesn't always work for everyone's mobility needs. We have also customized other ways for people to get inside of a Hut, which include longer and more shallow steps, steps with handrails (**fig. 2**), and various types of ramps for wheelchairs or people that use a walker (**fig. 3**).

**Figure 1.** A step in use in front of a Hut

**Figure 2.** An example of more gradual steps with handrails designed for someone who went through knee surgery

**Figure 3.** A ramp for use by someone in a wheelchair. Also, notice the Hut is a custom size to accommodate the larger sized door (36") and larger interior space to maneuver a wheelchair.

# Making More Storage Capacity – Outside Storage Bins

As you can imagine, living in sixty square feet of space with all of your belongings can be a challenge. Some stuff just won't make it in or will be stored on the side of the Hut, most likely in the elements. We've learned that when people get a small space of their own, they welcome having a place to put their stuff. Over the years, we have acknowledged that they need to have a variety of options for how they store their stuff.

So, when a group of skilled Mennonite carpenters from a local congregation asked how they might put their skills and shop to use I knew the perfect project. The storage bins were immediately put to use by people living in the Huts and those who didn't have them became increasingly eager to get them attached to their Huts!

They are built like sturdy cabinets and given adequate paint or stain to be protected from the elements. The bins are mounted with four lag screws into the back-wall framing. As you can see in the picture, there is also a hasp that can receive a padlock to keep belongings a bit safer. I haven't heard of much theft regarding contents of the storage bins, but bolt cutters would make quick work of a cheap lock on the hasp, so it isn't recommended for storing valuable items.

# Frequently Asked Questions

### 1. HOW DO YOU STAY WARM IN A CONESTOGA HUT?

The preferred way to heat a Hut is using an electric oil-filled radiator heater. These convection heaters are efficient and inexpensive, don't have any sort of open flame, and produce a nice dry heat (as opposed to wet heat, like a propane heater produces). We use the smallest model we can find, which is around 700 watts. The only downside to this type of heater is that you do need a solid AC electric source (heaters cannot be run on a battery system). A hookup for 120-volt AC electricity is not available in every location we place a Hut.

We've experimented with other kinds of heat, such as Buddy propane heaters, candle heaters, and heated rocks, with varying degrees of success, as well as some learning experiences. We've also designed, but never actually implemented, rocket stoves that would be fired from the outside and have a chimney that travels into the interior and then outside to exhaust. People have different degrees of capacity to manage heating options, and we've found to best meet the needs of our diverse clientele, we need something that is easy to operate and safe.

The other best option for people who are experiencing homelessness is simply a good sleeping bag. In the Pacific Northwest, temperatures are fairly mild. This means that for most of the year one won't freeze his or her butt off, like in other parts of the country that are much more unforgiving. Still, one rare time, when the temperature dropped to minus-7 degrees Fahrenheit, I slept in a Hut, alone, with a sleeping bag and wool blanket. I was easily warm enough all night while in the sleeping gear. When I got up the next morning, the temperature was 11 degrees F outside of the Hut, and the inside was 33 degrees F just from my own radiant body heat.

### 2. HOW DO YOU PROVIDE ELECTRICITY TO THE HUTS?

When we explored the possibility of hard-wiring electricity into Huts we hit some roadblocks, so we found the easiest alternative, which is to run an outdoor electrical cord from a nearby power source into the interior of a Hut. There are some basic rules that you want to follow to make sure your operation is safe. Discuss the electrical load you are planning to run in the Hut with an experienced electrician so you can choose the right length and size of cord. Our general practice is to limit the amount of electricity consumed within a Hut by allowing the basics: light, an efficient oil-filled radiator heater, cell phone and laptop chargers, and maybe a one-burner electric cooker only to be used on the front porch, not inside the Hut. We typically discourage use of refrigerators, microwaves, and old CRT televisions (the big boxy kind).

Residents should only use unmodified UL-listed devices that have not been tampered with. Any electrical device you purchase in a store should be UL listed.

Another alternative is to build a 12-volt electrical system instead of using 120-volt AC, which is the kind coming from standard wall sockets. 12-volt systems have more limited capabilities but can be better suited to structures that are not on the electrical grid. We have designed and experimented with this kind of electrical source with acceptable results. Maybe in a later edition of this manual, if there is enough demand, we will add a section about adding a 12-volt system that can power a light, a fan, and a way to charge a cell phone. It isn't hard to find kits that will do this for you, so you don't have to wait for us!

### 3. HOW DO YOU MOVE A FULLY ASSEMBLED HUT?

After building more than 120 Conestoga Huts we've learned the value in having multiple ways to pick up, put down, and transport them in a safe manner. Early on, we mostly used people-power to move Huts, which is still my personal favorite way, but also the riskiest. If one person goes down the possibility of injury goes up for everyone. Someday I would like to get a contract for a local football team to move huts this way, "hut, hut . . . lift!"

Ten volunteers handloading a Hut onto a flatbed trailer

After lifting 20 or so Huts this way without a single injury, we figured it would be best to stop doing it this way and invent a way that didn't put people's physical safety at risk.

Our next strategy for lifting a Hut involved a series of jacks, blocks, and beams to lift a Hut up high enough to drive a trailer under the lifted Hut. After the trailer was in position, you can lower the jacks and set the Hut on a flatbed trailer. This strategy achieved safety but is a very slow process.

Our project coordinator is working now to revise the jacking strategy using a mobile vehicle lift and rollers. The idea is to lift the Hut up and then move it onto our flatbed trailer on some tracks with rollers. We are hopeful that we can design something that goes more quickly, and is safe and relatively inexpensive.

We and a group in Walla Walla, Washington, have used a forklift to pick up Huts. This works very well for moving them around, especially on paved parking lots, but then the trick for us is moving the forklift around and the overall cost of the forklift. We do plan to form a relationship with a local construction equipment company for moving jobs involving more than a few Huts.

A borrowed forklift helped us move six Huts at a Safe Spot Community in Eugene, Oregon. The owners of the site needed to re-organize the layout to free up some space in the parking lot.

As for transporting Huts, we have have delivered them 60 miles away using come-along ratchet straps and a trailer rented from U-Haul with no issues. I recommend putting the window side of the Hut facing toward the direction of travel to avoid having the porch act as a wind-sock. When I have done this, I also brace the lower part of the rear eave to prevent it from flapping in the wind current. I mostly do this for piece of mind while traveling. I can't say that the movement of the rear eave will do any long-term damage to the Hut.

Moving Huts as one piece gets tricky if there are obstacles that prevent pulling a trailer up close to the Hut location. We've built a few Huts in backyards that are only accessible by a 4′ wide pedestrian gate. In those instances, moving a Hut requires taking it apart. Taking a Hut apart is a good time to decide if it needs any cosmetic repairs. We designed the Hut in such a way that it can be taken apart and refurbished as it is rebuilt to be used indefinitely.

### 4. WHY DO WE USE TPO AND VINYL FOR THE ROOF MEMBRANE? WHERE DO WE GET IT?

We've been building the Conestoga Huts since 2011 and started using the TPO/vinyl membranes starting in 2017 (we've also replaced nearly all of our older designed roofs to be the TPO/vinyl combination), so we don't have the experience of this material degrading to the point that it cannot be used. Both the thermoplastic polyolefin (TPO) and the commercial-grade tent vinyl have been specified to have a life-span of an estimated 20–30 years depending on the quality of the material and UV exposure.

To get the TPO, we have an ongoing relationship with a local roofing contractor who often has large rolls in his shop for jobs. We give their shop a call and order 10 rolls at a time, which cost us about $120 per roll. The contractor delivers the rolls to our shop in individually wrapped pieces that are 10′ wide and 18′ long when unrolled.

For the vinyl, we work with a company on the East Coast called BondCoteTM that specializes in advanced composite fabrics for many industrial purposes. Their sales representatives have been very helpful in helping to identify high-quality materials that will stand the test of time and uphold well in the elements. The cost of the vinyl is around $50 per Hut.

A good way to ensure that you have a roof that will meet the needs of your climate is to call a local roofing company and get them involved in the project.

We have designed the roof to be a two-tone design out of the need to be aesthically interesting and attractive. This is one reason the Conestoga Hut has been successful in our neck of the woods, because it doesn't look bad and it is easy to maintain. During the summer time we get out the pressure washer and spray down the debris that has accumulated to keep up a positive appearance.

## 5. HOW MANY PEOPLE CAN SLEEP IN A HUT?

The short answer to this question is one person. I tend to think of the Hut as a hard shell to go around your sleeping bag that holds a little heat, offers protection from rain and snow, and gives someone a lockable place to store a few belongings.

The longer answer is that I have known plenty of couples who temporarily make it work and get really creative with how they arrange the space. To attempt to provide more space for individuals and couples, we've designed two different wooden bed frames, one for couples and one for individuals, that provide space underneath for storage in totes or bags. When we place a Hut we almost always provide one of these bed frames with a futon or twin mattress (on pages 67–68 you will find the plans for the frames that we build).

## 6. WHAT ABOUT USING CARPETS INSIDE THE HUTS?

Early on we did install low-pile carpets in the interior of the Conestoga Huts. But we quickly learned that this wasn't a good idea because they would get destroyed after a few tenants. Then, our crew would have to go back and change out the carpets only to have the same thing happen again.

As a solution, we said, "forget the carpets," and decided to paint the floors with two coats of floor paint. Hut residents can find their own throw rugs if they like. If, when those residents leave, the rugs are destroyed, we simply remove them and toss them into the garbage.

All that being said, a carpet can be a nice touch to a living space. They do need more care and maintenance than a solid surface floor, which is why we don't use them in our standard design. We don't know the living habits of a lot of our clients. Some are immaculate and care well for their spaces, and some are not. Better to design for the worst-case scenario.

### 7. WHAT TO DO ABOUT CONDENSATION WITHIN A CONESTOGA HUT?

Condensation happens in Huts for the same reason that condensation forms on the inside of car windshields on some cold mornings: the air in the car is warmer than the air outside and when the warm air touches the cold surface of the windshield it turns to a liquid form.

An electric heater, preferably the electric oil-filled radiator type, is one of the best ways to reduce the humidity inside a Hut and prevent condensation. But this does require a source of electricity. Here are two other ways to manage the condensation while being off the grid:

If possible, leave soaking wet belongings on the front porch to dry a little before bringing them inside.

Allow venting to happen by not blocking the vents in the front and back walls, even when it is cold outside. The best way to stay warm at temperatures below 40 degrees Fahrenheit is to have a good sleeping bag to curl up in. Proper ventilation will prevent the air inside the Hut from becoming too warm from your own body heat.

We have only had the experience of using the Hut in the Pacific Northwest. Every climate will present its own challenges for living in a shelter that doesn't have a form of air conditioning.

### 8. DO YOU HAVE ISSUES WITH MOLD IN THE HUTS?

The recipe for mold spores to grow requires three conditions: 1) food, like the cellulose in wood or cotton, for example, 2) moisture build up, and 3) extended periods of time with the first two conditions being met. Almost any structure can become infected with mold if not cared for properly.

But we don't see many instances of mold in the Conestoga Huts. We saw more in our earlier models and realized that we needed to treat the interior like an exterior environment by treating the wood with an exterior stain and sealer so it could stand up to a moister environment, especially for Huts that aren't heated with dry heat. Also, we made our vents above the door and the window larger so there would be more airflow, which is the best defense against mold problems in almost any situation. Airflow is absolutely critical in wicking away moisture from spaces. Most often, mold issues arise in living spaces because wet items build up and moisture is trapped in by ventilation being cut off.

### 9. HOW TALL IS THE INTERIOR OF THE HUT?

When standing inside in the very center of the Hut, it is about 6′ tall. That maximum height can be frustrating for taller people who are prone to bumping their head on things, so it takes a little bit of getting used to.

### 10. HOW WELL DOES R-TECH WALL INSULATION PERFORM AS AN INTERIOR WALL OF THE HUT?

This material has some pros and cons as an interior wall and insulation. The pros are that it adds an important layer of insulation (without which the interior will experience heavy condensation in cold weather), it is easy to install, and it has "flame spread" and "smoke-developed" ratings (test method ASTM E84) that meet Oregon's residential code for interior wall material. But it is not supposed to be used as an interior wall material based on code because it is plastic foam material. We are currently working towards a solution that would be a more acceptable approach for interior wall insulation, but in the meantime the R-Tech wall panels are working well.

Besides not being totally code compliant—remember we are talking basically about a form of refugee housing and not a permanent residence—there are a few other strikes against the material. For example, it gets battered up very easily (in a small space like a Hut it is easy to bump into it regularly), mice can easily chew through it and make a mess, and it practically evaporates into thin air when exposed to an open flame (though it doesn't ignite and burn independently).

We've had one experience with a severely mentally disturbed person who set fire to her belongings within the Hut. This person was a hoarder and filled the Hut as much as she could and one day had a panic attack and set her stuff on fire. Her stuff burned, but, in the time it took the fire department to respond, the Hut did not ignite. The only real damage was in the R-Tech insulation, which partially melted, creating a foot-in-diameter hole in the ceiling above the flames. The person was treated for smoke inhalation and was not hurt otherwise. We think twice, at least for now, about putting folks with severe mental illness into the Huts, but still would like to further develop the Hut to be a safe temporary habitat for anyone.

### 11. HOW MUCH DOES A CONESTOGA HUT WEIGH?

The Conestoga Hut, not including the foundation component, weighs approximately 980 lbs. If you are using fresh lumber it could weigh more initially. We use kiln dried lumber to reduce the extra weight and to prevent excess moisture within the Hut components.

# Helpful Checklists

## Hut Kit : Check List

revised - 11/2019

Job Description:
Job Date:

| Item | Ready | Loaded |
|---|---|---|
| Cattle Fencing Roof Panels, (3) 50" x 16' (1) 25" x 16' | | |
| (4) Pier Block Bases | | |
| (4) Adjustable Post Brackets | | |
| (2) Foundation Beams - 4" x 4" x 10' | | |
| (2) Floor Sections (*front & back*) | | |
| (2) Wall Braces - 2" x 4" x 14' 6" (*left side & right side*) | | |
| (2) Wall Sections (*front & back*) | | |
| (1) Steps - 7" x 24" x 36" | | |
| (1) Deck | | |
| (2) Deck Legs | | |
| (3) 2"X 2"x 8' Floor Trim Pieces (*cut to length*) | | |
| (1) TPO - Rubber Roof Membrane (10' x 18') | | |
| Vinyl Roofing - (1) - 5' x 17' 6" roll, (1) - 30" x 17' 6" roll | | |
| (1) Mattress | | |
| (1) Bed Frame, (10) -1" x 6" slats | | |
| Reflectix Insulation Rolls, (2) 4' wide, (1) 2' wide | | |
| Insulation Panels - *Walls* (4) 48" x 65" (2) 16½" x 65" | | |
| Insulation Panels - *Ceiling* (3) 30½" x 45½" (1) 21¼" x 45½" | | |
| (2) Moisture Strips (*felt roofing paper*) | | |
| (48) Saddle Clips (*1" PVC pipe*) | | |
| (1) Smoke/Carbon Monoxide Alarm | | |
| (1) Curtain Rod & (1) Full Curtain (*2 piece*) | | |
| | | |
| Various Hardware : | | |
| 3", 2¼", 1¼" Star-Drive T-25 Screws, T-50 - 3/8" staples, 1¼" Roofing Screws | | |
| Rebar Wire Ties, Plumber's Tape Brackets, Aluminum Tape | | |
| | | |

# Hut Tools: Check List

revised - 11/2019

Job Description:
Job Date:

| | | Ready | Loaded |
|---|---|---|---|
| | | | |
| | | | |
| | Impact Drivers and Drills | | |
| | Driver Bits - T-25, 1/4" Hex Nut | | |
| | Circular Saw | | |
| | Retractable Razor Knives | | |
| | Speed Square | | |
| | Hammers | | |
| | Staple Guns & 3/8" T-50 Staples | | |
| | Rebar Wire & Twist Tools | | |
| | Ladders | | |
| | Levels - 6' & 4' | | |
| | Tape Measures | | |
| | Chalk Line | | |
| | Foundation Jig | | |
| | Pry Bar | | |
| | Folding Table or Saw Horses | | |
| | Safety Gear & First Aid Kit | | |
| | Trash Bag | | |
| | Broom & Dust Pan | | |
| | Volunteer Sign-In Sheet | | |
| | | | |
| | | | |
| | | | |

This manual presents step-by-step instructions on how to build a Conestoga Hut: a simple, inexpensive shelter for temporary emergency housing. With photos and illustrations, it guides you through the tools and materials you'll need, how to build the five components of a Hut in a shop ahead of time, and how to assemble the components at the build site. The manual also shows how community volunteers can be engaged in the building process, one of the most rewarding aspects of the Conestoga Hut experience.

"It's just a wonderful structure, you could almost kiss it. It's so well thought out. It's a wonderful stopping off point to go from one direction to another. It's an interim thing, to give people that step up they need."

—**John Porter**, former Planning Director for the City of Eugene

"I had heard about the Huts, had seen them from a distance but I had neve been in one. Once I got it, I was like, 'Wow, this is like a castle.' It really is. Just to be able to stand up in the morning, simple things like that, it really is a Godsend. As simple as it's built, I thought, 'Wow, this could really go a long way, to help a lot of people.'"

—**Patrick Blaine**, former Hut resident, Wesley United Methodist Church, Eugene, Oreg

"It's nice to be warm. It's nice to be dry. It's nice to lie down on a bed and not just a sheet and a cold floor. . . . I know I can wake up on a good night's sleep. And then get up, go to work or look for work, knowing my stuff is safe and dry and knowing at night I'm coming home to something. . . . I'm very very grateful for that. [The Huts mean] people are not getting sick and going to the hospital and . . . are keeping people out of jail for trespassing. I wish the community could see more of that."

—**Frank Haller**, former Hut resident

Erik de Buhr and his wife Kristin Fay are the founders and leaders of Community Supported Shelters, a non-profit established in Eugene, Oregon, in 2013 that focuses on creating low-cost, big impact strategies for supplying basic shelter and supportive community to those in need.

Community Supported Shelters

www.communitysupportedshelters.org

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