CONGRATULATIONS!

You've just purchased Vardo plans designed by Portland Alternative Dwellings.

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PORTLAND ALTERNATIVE DWELLINGS

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BASIC CONSTRUCTION

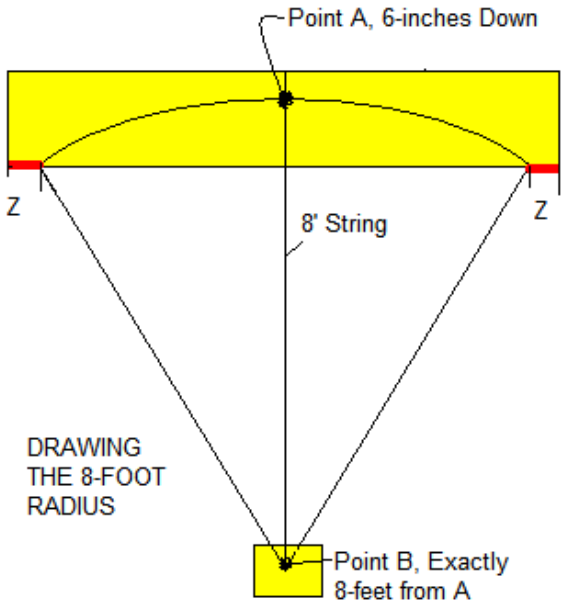
The Vardo foundation is comprised of a metal trailer and wood floor frame. Our e-book ***Go House Go*** provides more information about how to bolt the floor to the trailer, and highlights our recommendations for building a little house that can handle the vibration and wind shears typical of highway travel. ***Go House Go*** also provides information about basic engineering, code restrictions, insurance options, moisture control and ventilation, electrical systems, plumbing and gas systems, green building, and other key construction tips. Please contact us to learn more about our e-books, workshops and to request a current list of resources. We'd love to help you go small.

ROOF

The Vardo's roof is unvented and includes the construction of hand-built rafters, laminated out of thin strips of fir. Each rafter follows an 8-foot arc that starts at the center of the front door.

RAFTER FORM – The construction process starts by creating a Form to which you'll clamp the fir. There are many ways to create that Form; the key is to create something that is beefy enough to secure the laminated form without twisting. Here's one way to do that:

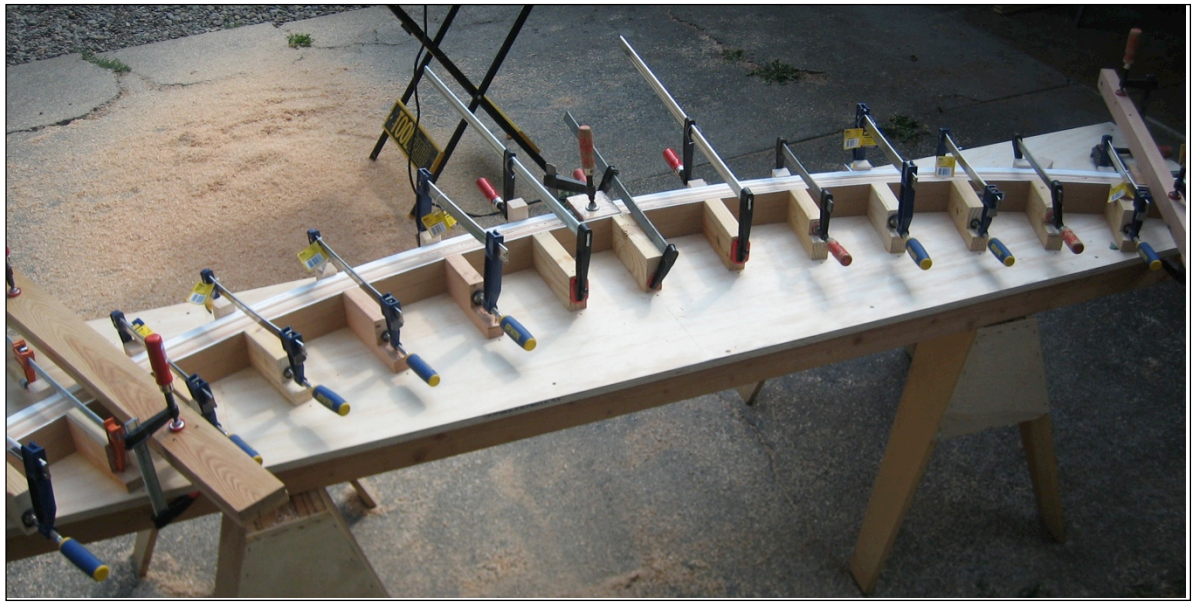
- Create a 2x10-foot platform out of ¾-inch plywood that is screwed to two ten-foot lengths of 2x4's set on edge to keep the plywood rigid.
- Draw an Arc on the Form, replicating an 8-foot radius. The top of the arc should rest 6-inches from the top edge because that's where the laminated wood will sit. Essentially, as shown in our drawing below, you can attach one end of an eight-foot string to a nail at Point B; fix a pencil to it at point A, and then draw the arc on the Form.



- After you've drawn the arc, measure the distance (Z) from the left and right sides of the Form to see that they match. If not, double-check the placement of A and B; check the perpendicular, and the centerline.
- Cut several 5-inch sections of two-by-four that can be glued and screwed to the Form. Place them on edge, perpendicular to the interior side of the arc. Place a block every 8-inches along the curve, and then trace around each block.
- Remove the blocks and drill two holes through the Form in each penciled section. Now, glue each block back in place, making sure that the ends of the blocks are lined up with the arc line.
- Once the glue is dry, flip over the Form and install 3-inch screws through the Form into the blocks (use your pre-drilled holes as guides). Be sure to predrill the screws, so they don't split the blocks.
- Once the clamping blocks are firmly secured to the Form, create a smooth surface for bending the fir (this is sometimes called a "lamination bed"). Use an 11-foot length of 1x3-inch Medium Density Fiberboard (MDF); it's cheap, very bendable and has a smooth surface. Glue and screw this piece of wood to the end of each clamping block, creating a nice smooth arc.
- To complete the Form, use clear packing tape to cover all surfaces that may come into contact with the lamination. This makes it easy to remove the laminated rafter because it prevents it from sticking (getting glued) to the Form.

Now you have a great Form to make the bent rafters and all other moldings and pieces that need to match the curve of the roof.

Roof Rafters Continued



Each rafter is made of 14 laminated strips that create a 3-1/2-inch thick rafter. Each strip is ¼-inch thick by 2-1/2-inches wide, and will be 12-feet long. The front rafter (over the porch) is made with only 9 laminations, and you'll make one "rafter" to form the back arching window.

Laminating Tips:

- Make sure clamps, glue, a wipe-down rag, good music and hot/cold beverage are within reach before you start gluing. You won't want to stop halfway through the process.
- We recommend latex gloves to protect your hands, and waterproof Tite-bond III Wood Glue. You'll likely need at least a gallon to complete the job.
- Put the Form up on sawhorses to save your back, and make sure you have enough clamps to fix the strips to each wood block on the Form, and then a few more to clamp the bunch to the back of the Form so the lamination won't be uneven or twisted.
- Glue-up (laminate) each rafter in two stages: glue 7 strips together and let them dry overnight, and then glue the remaining seven strips the next day.

Laminating Tips (Continued):

- Spread an even layer of glue on each strip. It's better to ere with too much glue than not enough. The ideal amount will result in bit of "squeeze out" all along the joints.
- Clamp the layers against the center block first, and then work your way out to the ends.
- Place a strip of MDF or other wood on the outside layer to spread the clamp pressure and to prevent clamp marks on the rafter.
- Once all the clamps are in place take a breath and relax. Don't rush the process; make sure the glue is set before removing the clamps!
- Before you remove each rafter from the Form, mark the centerline on the top of the rafter and label each side, right and left. This will help maintain consistency should there be any variation in the curve, left to right. You may have a little "spring back" where the ends of your radius pop slightly off the form, but not to worry because this spring back should be the same on each rafter, leaving you with a consistent radius.

Again, be through and patient through the laminating process. The end result will be beautiful curved rafters, exposed on the interior of your Vardo… and that will be well worth the effort!

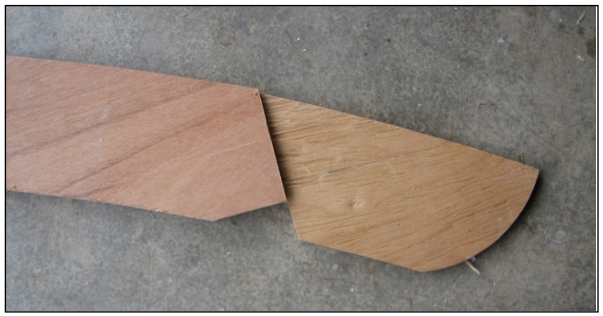
Rafter Milling -- When the lamination is complete, use a chisel to gently remove as much hardened glue as possible, and then run each rafter through a planer. This will mill-out any surface anomalies and will create a smooth surface on each side of the rafter. Each rafter will be about 2-inches wide and nearly 3-1/2-inches thick when you finish milling.

Shaping and Installing -- After milling, you'll need to create bird-mouths and tails on each rafter. We recommend that you create jigs out of ¼-inch plywood or MDF to be consistent and speed things along.

Cut a piece of ¼-inch plywood 2-feet wide, and as long as the Vardo is wide. Your Vardo width may vary from the plans (construction isn't an exact science) so be sure to measure your Vardo from the outside edges of the sheathing. Lay the plywood flat and mark the centerline. Lay a rafter on top of the plywood, with the bottom arc of the rafter touching the left and right bottom corners of the plywood. Line up the center of rafter with the centerline of the plywood. Trace the rafter onto the plywood. At the bottom corners (left and right, where the bottom arc terminated), measure up 1-3/4-inches and then draw a perpendicular line to create a bird-mouth. Cut everything out and make sure the jig fits atop the Vardo walls.

Do the same thing to create the rafter tail shape. In this case, you'll only need a small jig that compliments the bird-mouth.

Bird-mouth jig above rafter-tail jig.



Bird-mouth jig overlapping complimentary rafter-tail jig.

Trace and cut all rafters and then sand and finish them. Install them following the rafter plan for placement. We recommend a 6-inch screw through the top of the rafter into the top plate, and also two or more hurricane ties on each rafter (see H2.5 offered through Simpson Strong-Tie, re: www.strongtie.com).

Remember to set aside one of the rafters to make the transom window. Also, the bird-mouth on the porch rafter will not be the same as the roof rafters (the corbels will support it). Postpone cutting the bird- mouth on the porch rafter until after you have located the corbels.

Decking -- After the rafters are in place, the roof decking can be installed. We recommend ¾-inch tongue and groove fir, 3-inches wide and in 12-foot lengths (enough to span the entire length of the roof). Sand and finish the boards, then screw and glue them into place on the rafters.

Purlins -- Screw 1-inch thick wood strips along the edges of the decking (just above the end of the rafters), and then lengthwise every two-feet along the roof arc. Fill in the cavities created by the purlins with rigid foam insulation. If you'd like more insulation use thicker battens.

Roofing -- Glue and screw 1/4-inch plywood sheathing to the purlins. Install the fascia boards along the sides, front and back, and then coat the sheathing with a layer of water and ice shield. Install flashing and the metal roof according to the manufacturer's recommendations. All roofing materials should be screwed into the purlins, and if you're overlapping roof panels, be sure to start at the tail end of the trailer, and work your way to the tongue.

Back window framed with first rafter in place.

Rafter resting on truck, waiting to be milled.

Rafters in place and decking being installed.

¾-inch decking installed above all rafters. NICE!

Decking installed.

Rafters in place with decking.

Porch being installed after fabrication.

Porch being installed on the Vardo.

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Back windows and bench.

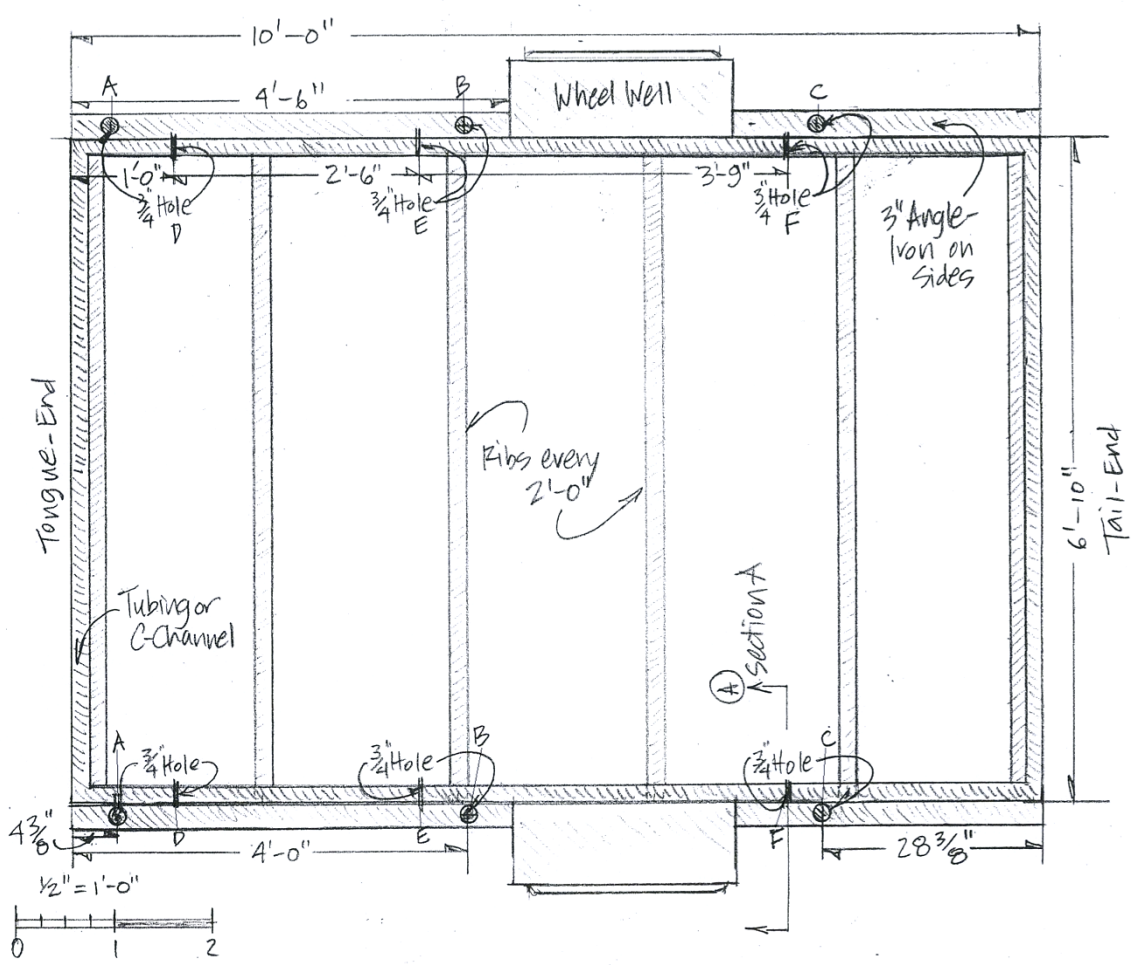
"Paperstone" Desk in the Vardo.

Lights installed along ceiling rim.

Transom Window

Kitchen nook in the Vardo.

Exterior Front



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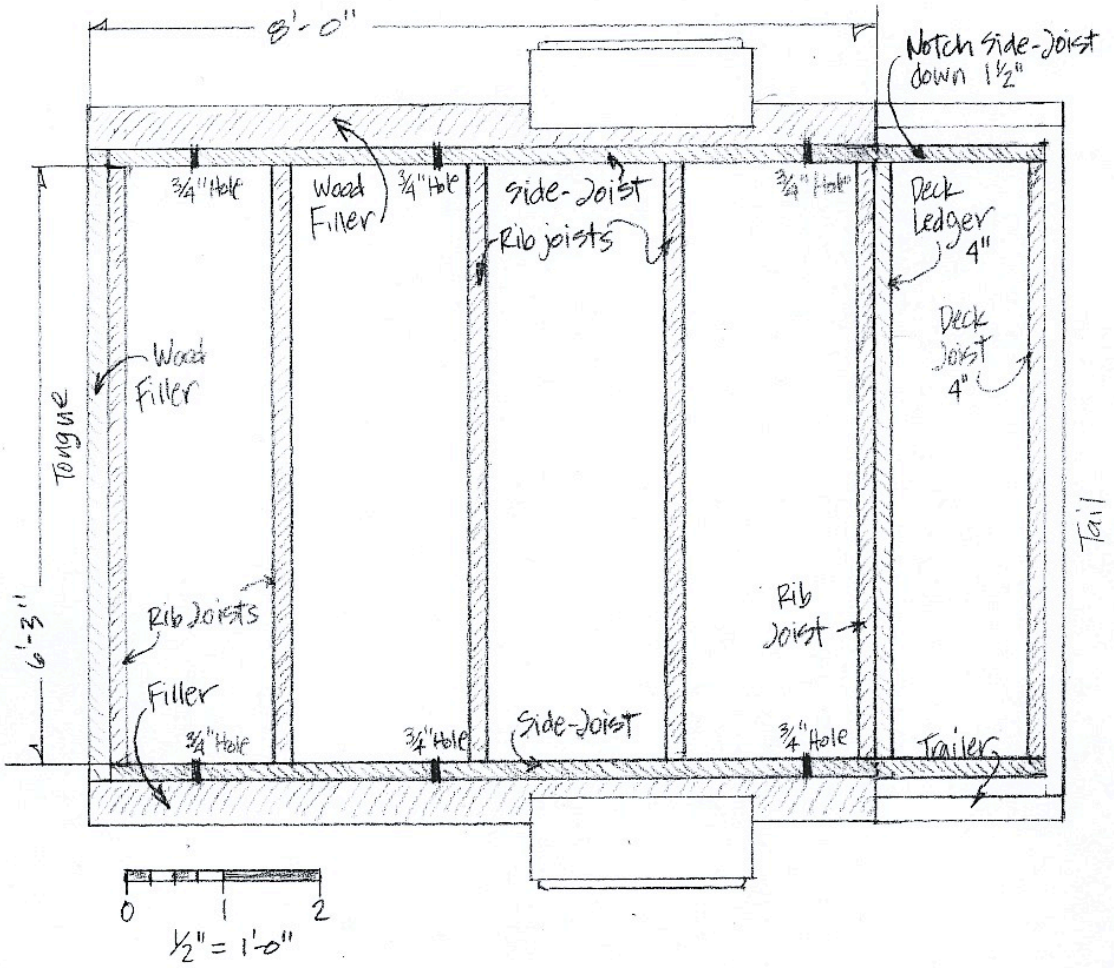

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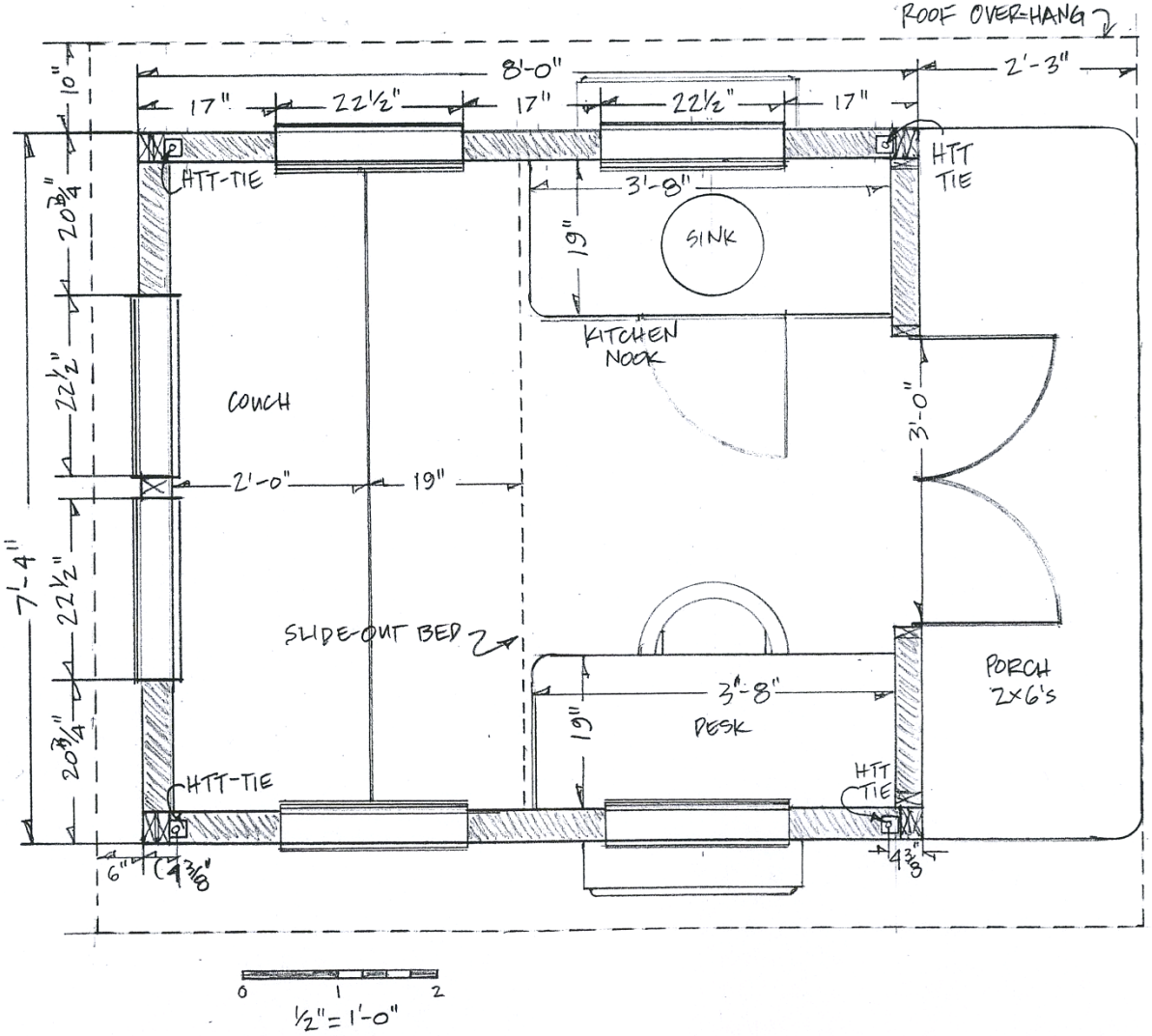

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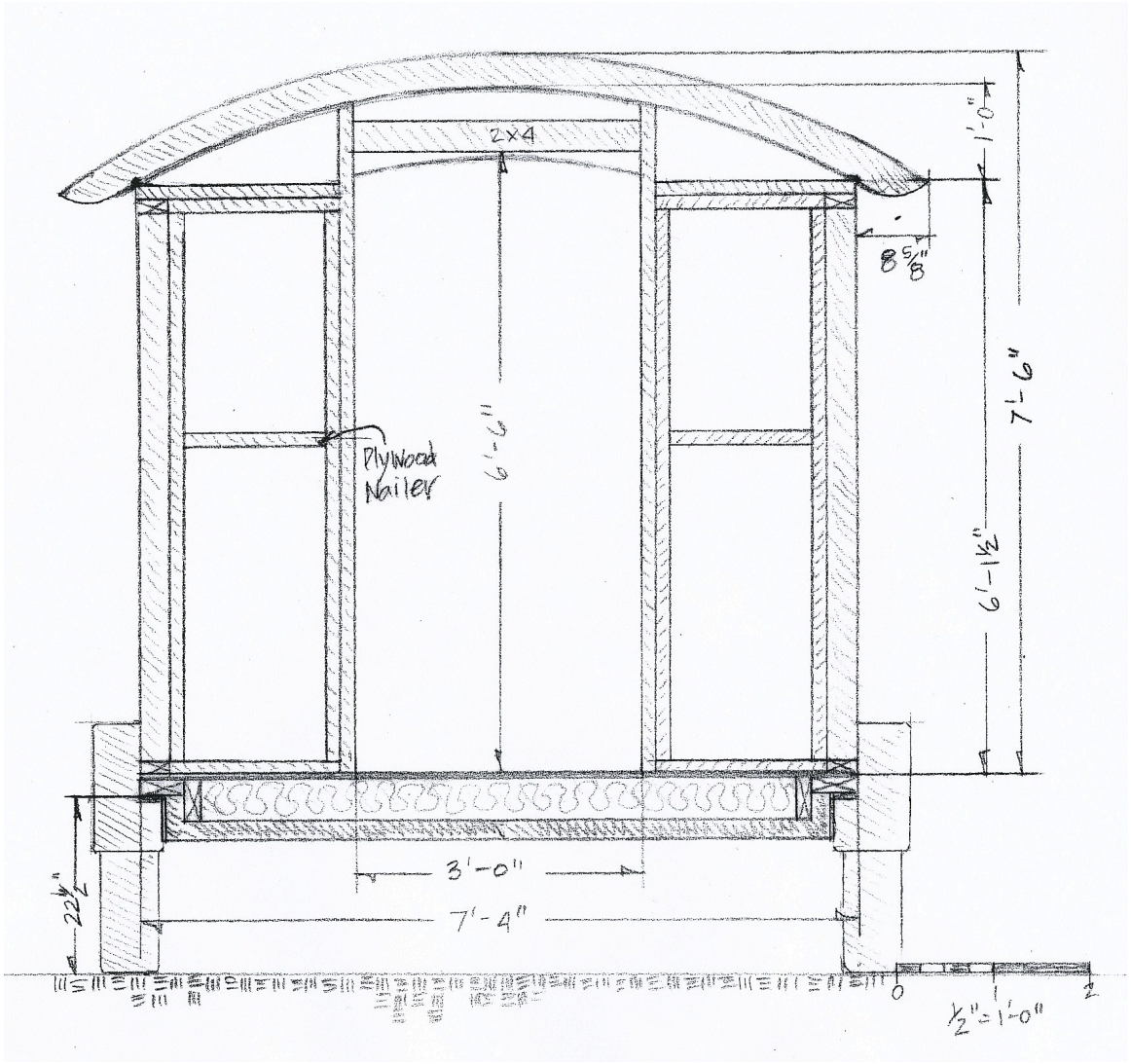

Framing is the same for the 12-foot Vardo.

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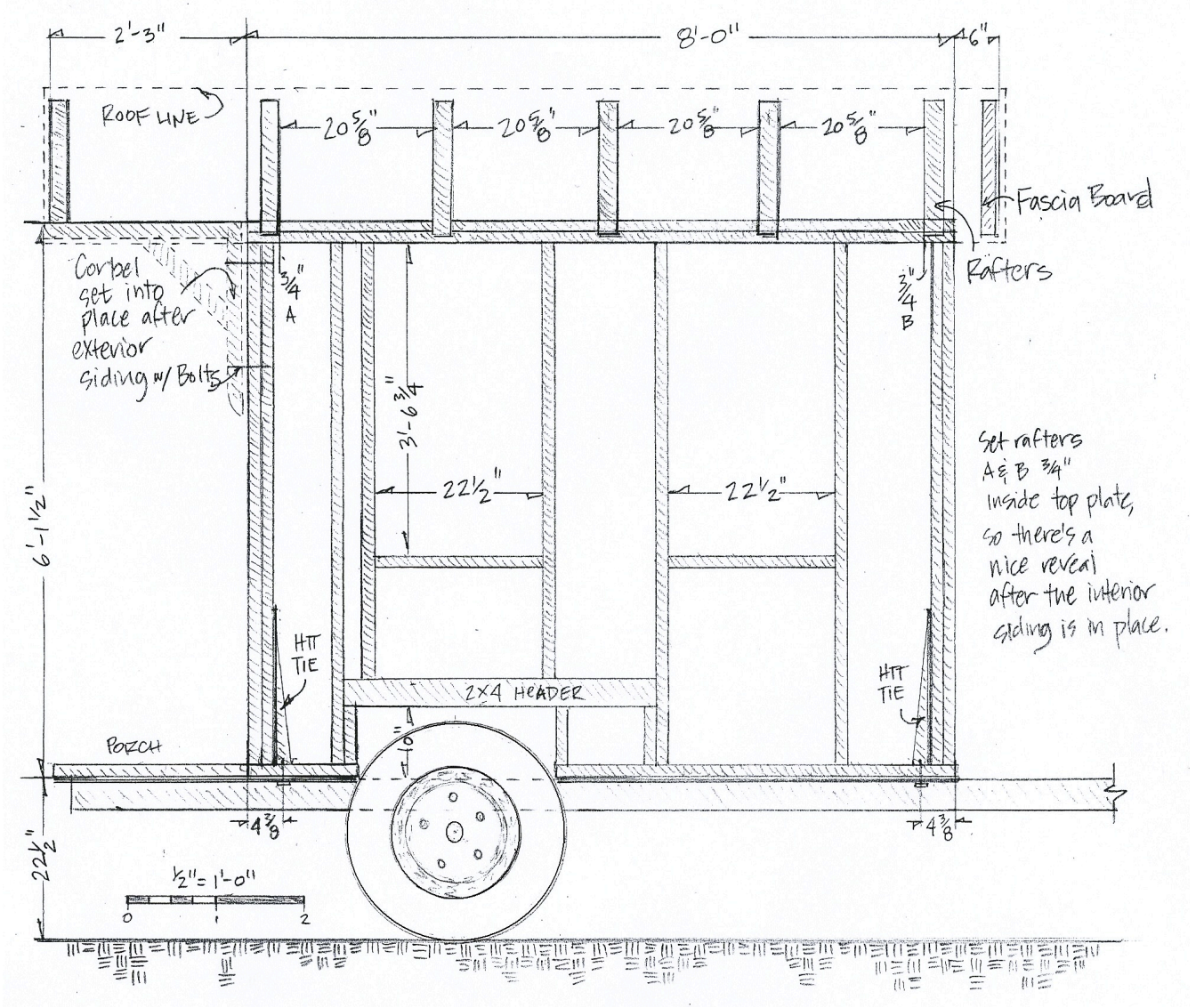

VARDO SIDE FRAMING

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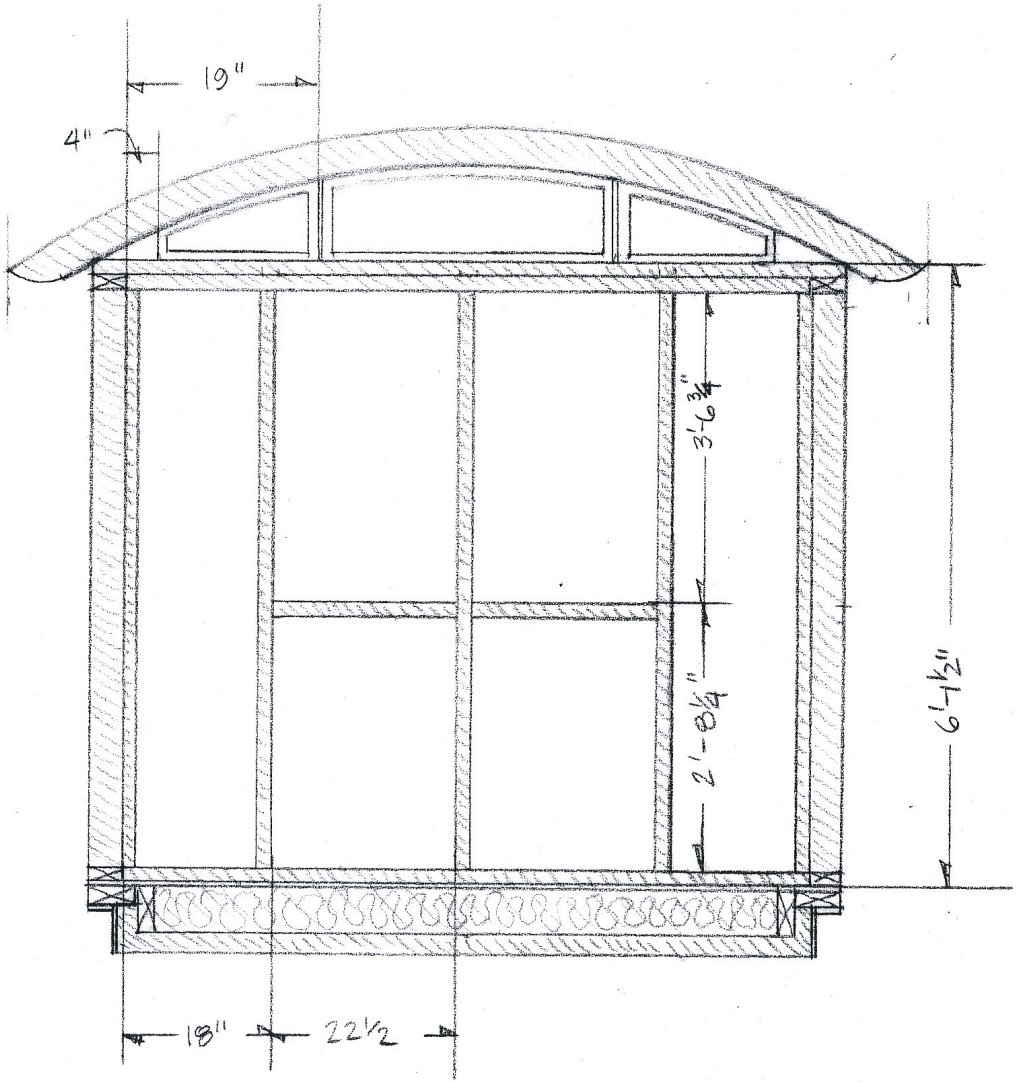

Framing is the same for 12-foot vardo.

VARDO BACK FRAMING

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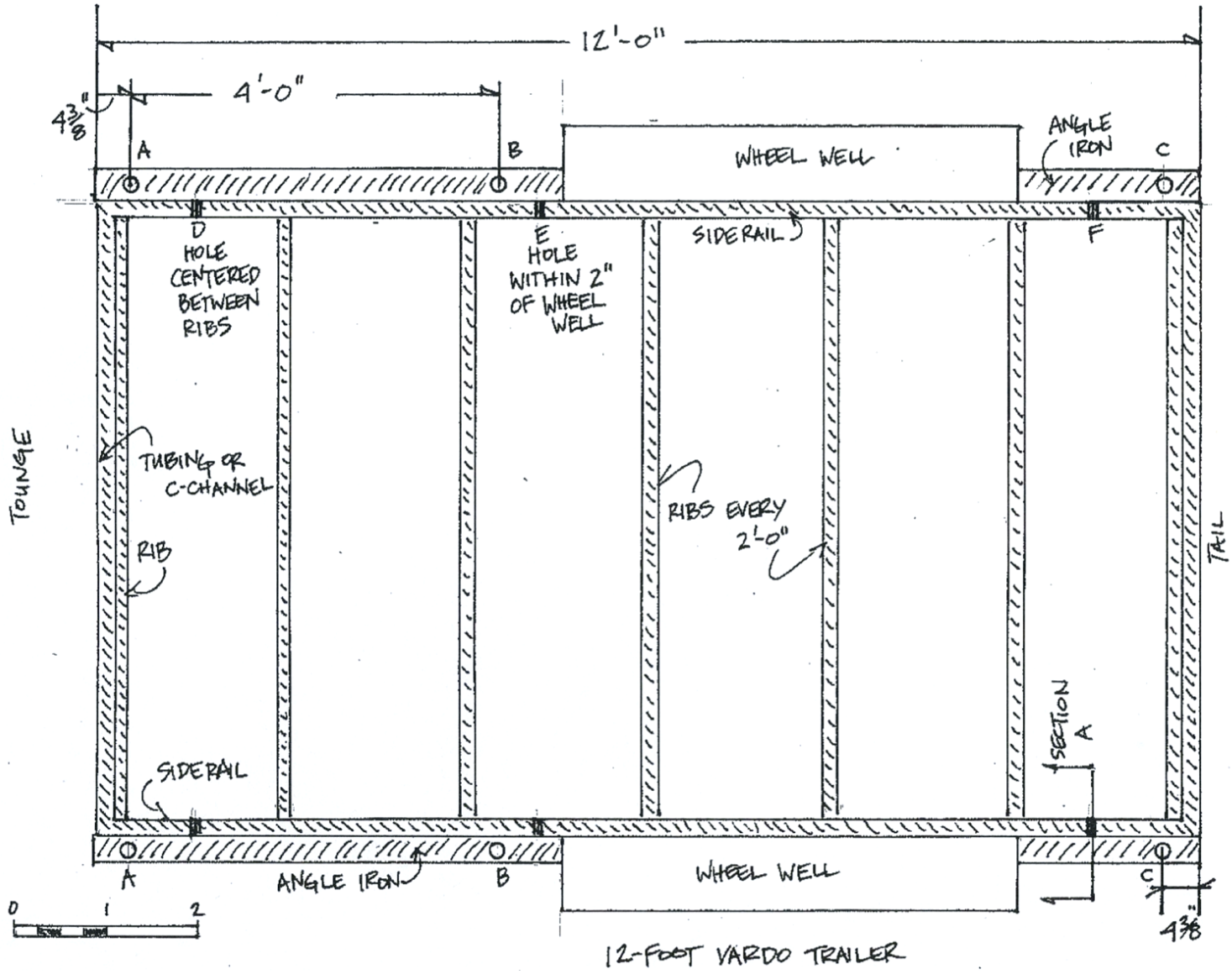

12-FOOT VARDO TRAILER

12-FOOT VARDO TRAILER FRAME

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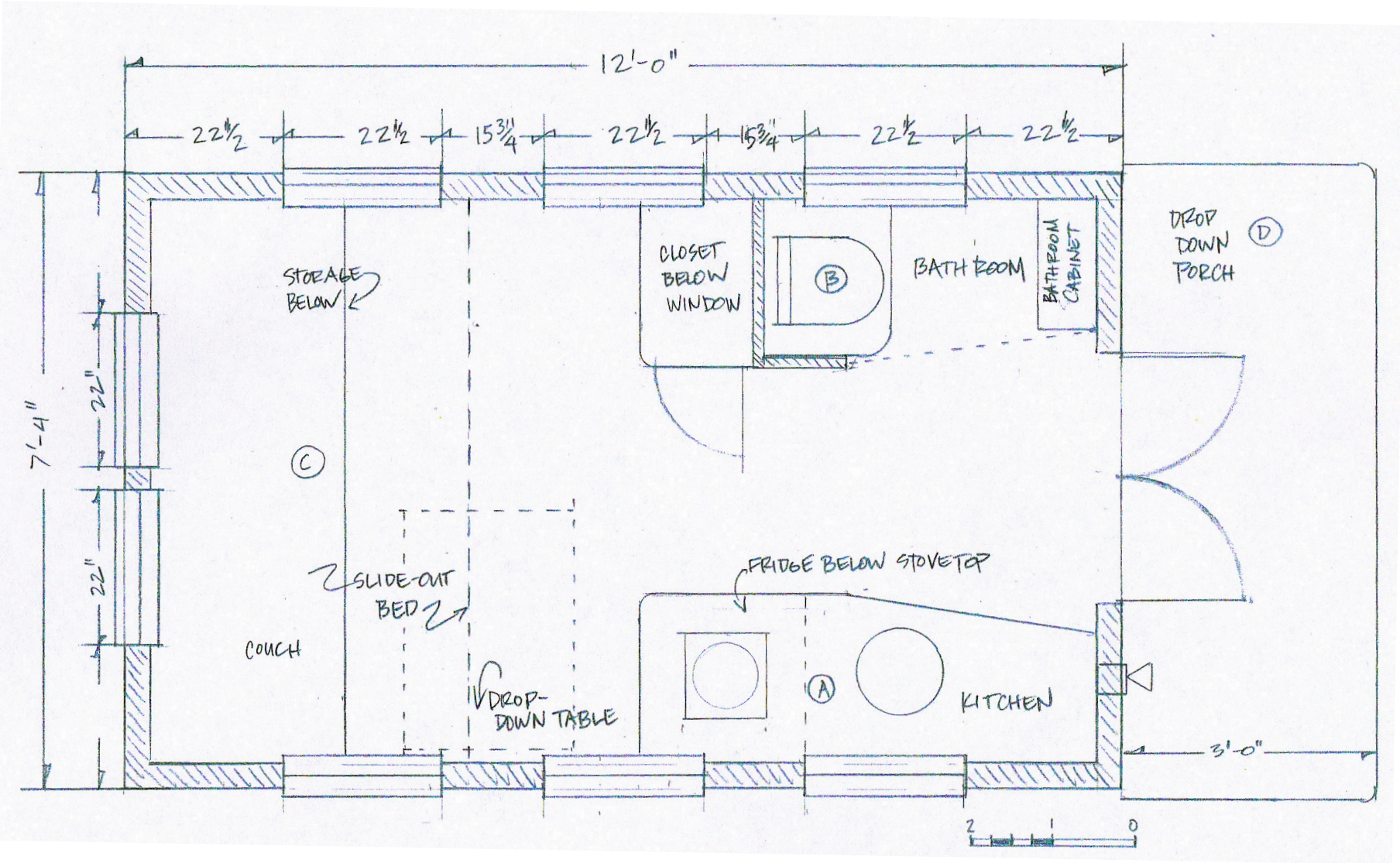

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12-FOOT VARDO FLOOR PLAN

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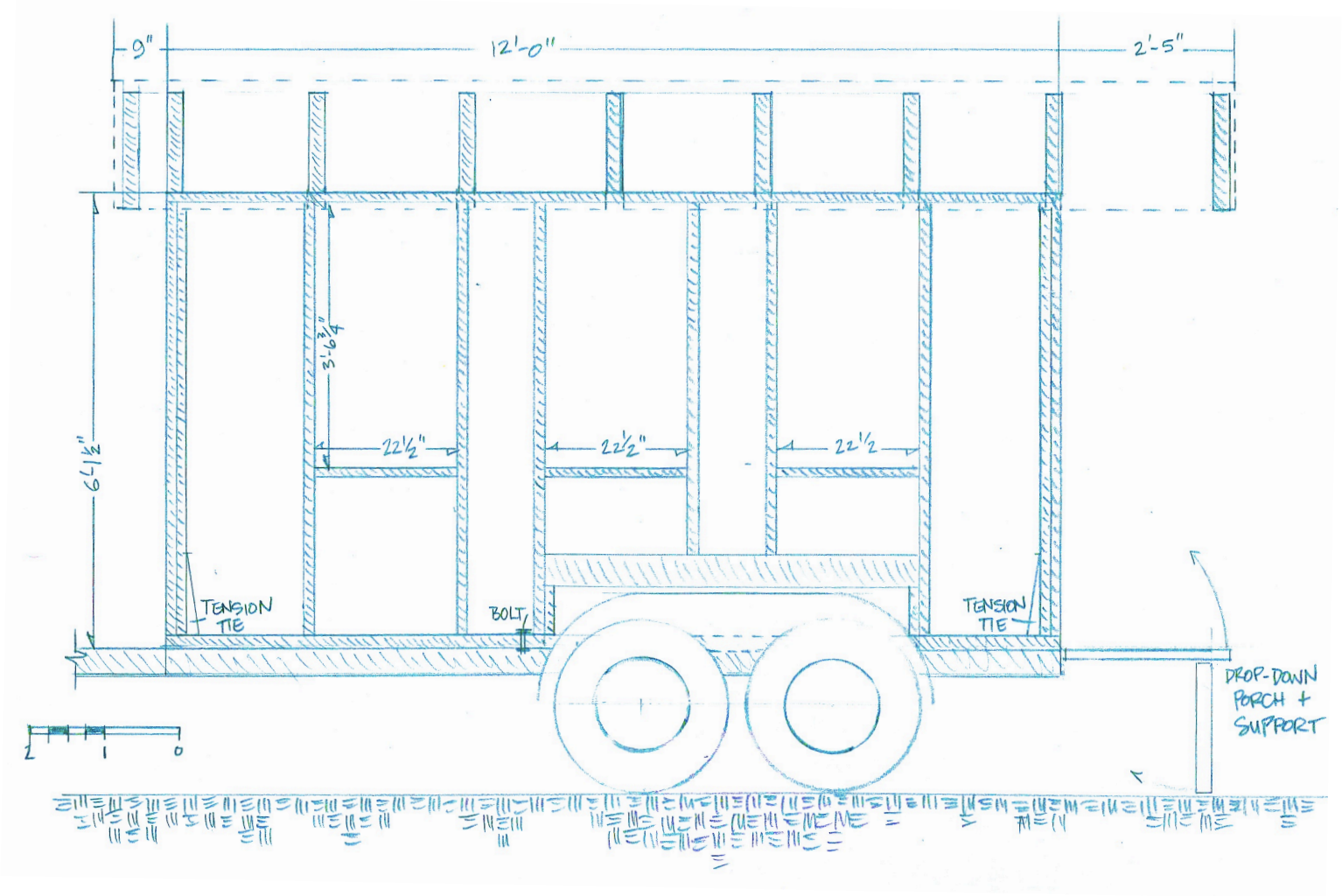

Mirror Image on the Second Side

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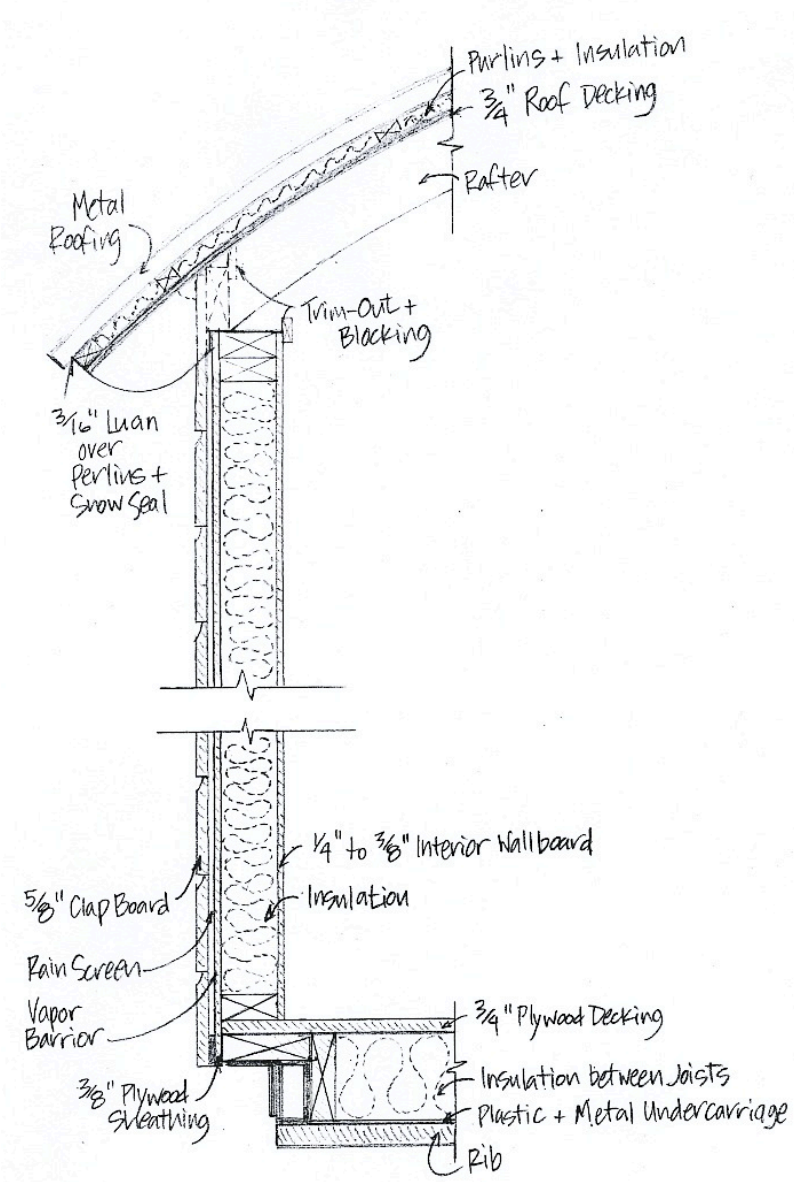
General Materials List

Foundation	Trailer ¼" Plywood Undercarriage Treated 2x6's 5/8"Bolts Screws, Glue Insulation ¾" CDX or OSB Plywood Flooring (Marmoleum, cork, etc.)
Walls	1/4 " to 3/8" Interior Wallboard Fir or Spruce 2x4's Insulation 3/8" CDX or OSB Plywood House Wrap ¼" to 3/8" Lathe & Pest Screen for Rain Screen Wall 5/8" Exterior Siding 6 Windows, French Door & Flashing Interior, Exterior, Trim HTT-Tension Ties & Nails 5/8" Bolts & Washers Screws, Glue
Roof	Laminated Rafters Fascia & Trim ¾" Roof Decking Purlins Insulation 3/16" Luan Roof Flashing Snow Seal, Tar Paper Metal Roofing Hurricane Rafter Ties & Nails Screws, Glue Corbels & Bolts
Porch	Flashing over Joists Cedar 2x6 s Screws & Fasteners



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Feel free to contact me at Portland Alternative Dwellings, www.PADtinyhouses.com
if you have any questions about tiny house building or about the information in this plan package.

I wish you the best in all that you do.

Dream Big, Build Small & Be Safe
Dee Williams