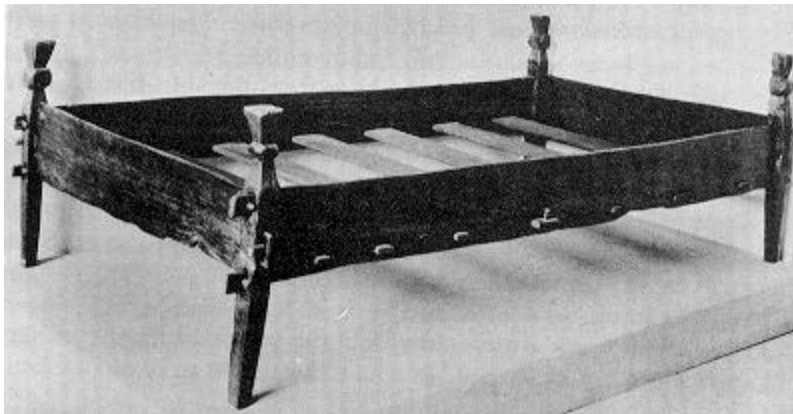
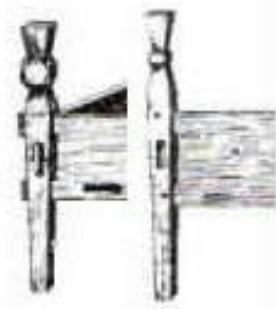


***A few notes on the design and making of a
10th century Viking bed***

*Lord Rhys, Capten, gen y Arian Lloer
Midrealm*



In 1880 Antiquary Nicolay Nicolaysen of Norway began excavation of a Viking burial ship dated at approximately 890 A.D. It was buried approximately 900 A.D. These dates were recently determined by analysis of the annual rings in the oak material¹. Now known as the Gokstad Ship, this ship contained many artifacts including fragments of six oak bed frames all of similar style as this project. Antiquary Nicolaysen was able to fully restore two complete frames from the Gokstad ship. The only differences being size, some drilled holes that we can only speculate the reason for, and two slightly differing decorative cuts on the tops of the legs. The cuts can be seen in the illustration to the left drawn by Nicolaysen¹. All of these beds were of fairly rude workmanship. Of the two fully restored, one was 27 ½ inches high 42 ¾ inches wide and 89 ½ inches long.



The other was 29 ½ inches high, 43 ¼ inches wide and 56 ¼ inches long. The end-boards ranged from 11 to 11 ¾ inches wide, although the side rails were somewhat narrower than the end rails. The bedposts were about 3 inches square. The beds of this type in these two burials had two distinct leg patterns. In all of the beds found, the side rails were cut with two tenons that passed completely through mortises in the legs. These rails were secured with wooden wedges through mortised holes on the outside of the legs. And the end rails had one tenon each that also went through the legs, but between the tenons for the side rails. The end rails were also secured on the outside with wooden wedges. The only decorative details were a tapering of the legs and the above noted cuts on the upper part of the legs. The legs were mortised as mentioned above and had about a ¼” mortise to allow the rails to set into the legs slightly. The slats also had tenons and passed through mortises on both side rails at regular intervals with only the center slat being wedged to keep the side rails from flexing out when weight is on the bed. The slats would have supported a cloth mattress with straw ticking². A skeleton found at the site was over 6 feet tall, very strongly built, way above normal size for the time³. The variations in bed size and the extremely large size of the skeleton suggest that beds were made specifically for individuals or at least with their needs in mind, rather than to a standard size.

Professor Gabriel Gustafson excavated a second ship, known now as the Oseberg ship, in 1904. Built approximately 815 – 820 A.D., it was buried in 834 A.D. An Arab, Ibn Fadlan, traveling in Russia during the 9th century happened upon a group of Vikings who were in the process of burying a chieftain in his ship, and made note of his observations.

¹ Christensen, Arne Emil Professor. The Vikings. Ministry of Foreign Affairs, Norway. 1996. Pg. 4

² Nicolaysen, Nicolay. Langskibet Fra Gokstad Ved Sandefjord. The Viking-Ship Discovered at Gokstad in Norway. 1882. Reprint by *Books on Demand*. 2001. Pg.42.

³ Nicolaysen, Nicolay. Langskibet Fra Gokstad Ved Sandefjord. The Viking-Ship Discovered at Gokstad in Norway. 1882. Reprint by *Books on Demand*. 2001. Pg. 75.

His surviving journal has allowed us to date the Oseberg ship exactly⁴. The Oseberg ship contained the remains of five beds, all made from beech. Four of the beds were the same type of slat beds as those found within the Gokstad ship. The fifth bed had carved dragon heads on the bedposts of a completely different type at the head end. However the slats, side rails, and pair of legs at the foot of the bed are of much the same design as the other ten beds found in the Gokstad and Oseberg ships. Antiquary Nicolaysen believed that these beds were most likely reserved for the superior members of the crew⁵. Both of these ships are believed to have been private vessels for rich owners or nobles rather than longships for transportation of warriors⁶. Only the carved 'dragon' bed from the Oseberg ship has been restored from the fragments giving us three complete slat beds. Two from the Gokstad ship and one from the Oseberg ship, as well as fragments of eight partial frames, four from each ship. From these two ships it is apparent that this style of bed frame was used for three-quarters of a century or longer, changing little in style during that time frame. These ships and their contents are available for viewing in Oslo, Norway

⁴ Christensen, Arne Emil, Professor. The Vikings. Ministry of Foreign Affairs, Norway. 1996. Pg. 5.

⁵ Nicolaysen, Nicolay. Langskibet Fra Gokstad Ved Sandefjord. The Viking-Ship Discovered at Gokstad in Norway. 1882. Reprint by *Books on Demand*. 2001. Pg. 42.

⁶ Christensen, Arne Emil, Professor. The Vikings. Ministry of Foreign Affairs, Norway. 1996. Pg. 5 & 6.

Let's build the bed!

When I went to build a bed for my own use, I came up with a number of requirements. I wanted something period. It needed to breakdown for transportation and be fairly compact. It needed to be documentable, (it's the apprentice thing in me). It needed to offer a place to store items out of sight in my pavilion. After much research, I found a website that offered much of my needs. Master Charles Oakley has a very nice site with the basics for this bed. A great deal of my design is based on his. I then set forth on the research you see above. I made some changes to my basic design, the taper on the legs, the inset for the rails, the different decorative cuts based on my research on the beds I found. The added height was for storage under my bed. If you want a shorter bed, just cut the legs down a bit. This bed is designed to fit a full sized futon mattress, or a full sized air mattress. If you want something a bit larger, or smaller, just adjust the length of all four rails to meet your needs.

Purchase List

The original beds of this type used Oak or Beech that was available in that part of the world. Unless you live in Norway, availability in your area will vary. I recommend White Oak over Red. Other hardwoods could be substituted. I personally would not recommend pine or other softwoods for this project. But, if you gotta use pine, use 2x4, 2x6 and 2x8 for more strength. The wedges will be cut from the scraps left over as you make the bed. The hardest to find is the posts. In my home area, Menards is one of the big home improvement stores. They sell 4x4 oak post 6 feet long. They are made from glued up boards. These will work just fine. Using a table saw they can be resawn to 3x3. I cut mine a little large and used a planer to fine-tune the cuts. To make this bed, you need to purchase the following standard length boards

1. (2) 4"x4"x6 ft
2. (2) 1"x6"x8 ft
3. (6) 1"x6"x6 ft
4. (1) 1"x8"x6 ft

Cutting List

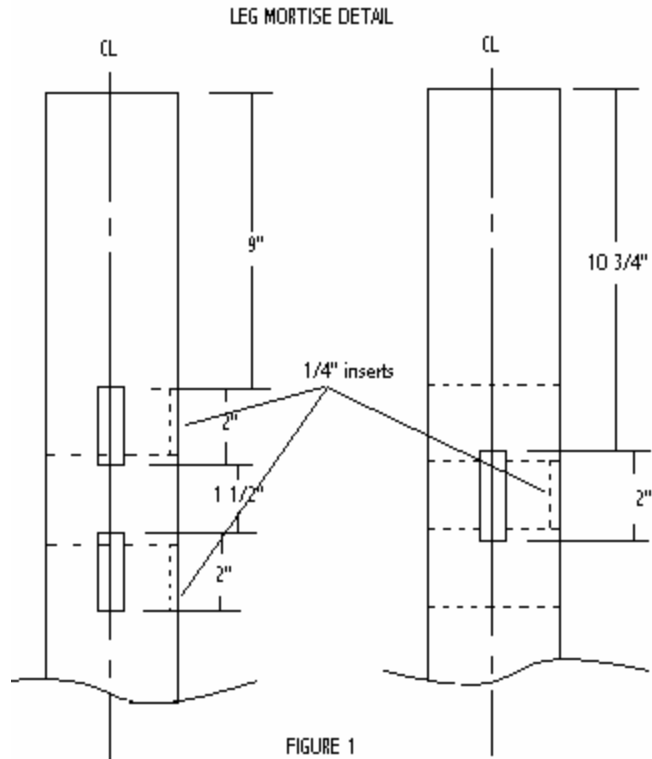
1. (4) 3"x3"x36" posts.
2. (2) 1"x6"x80" side rails.
3. (2) 1"x6"x61" end rails (or headboard and footboard).
4. (1) 1"x8"x58" the middle slat.
5. (4) 1"x6"x58" remaining slats.
6. Hold on to the scraps, you will use some for wedges.

Step One:

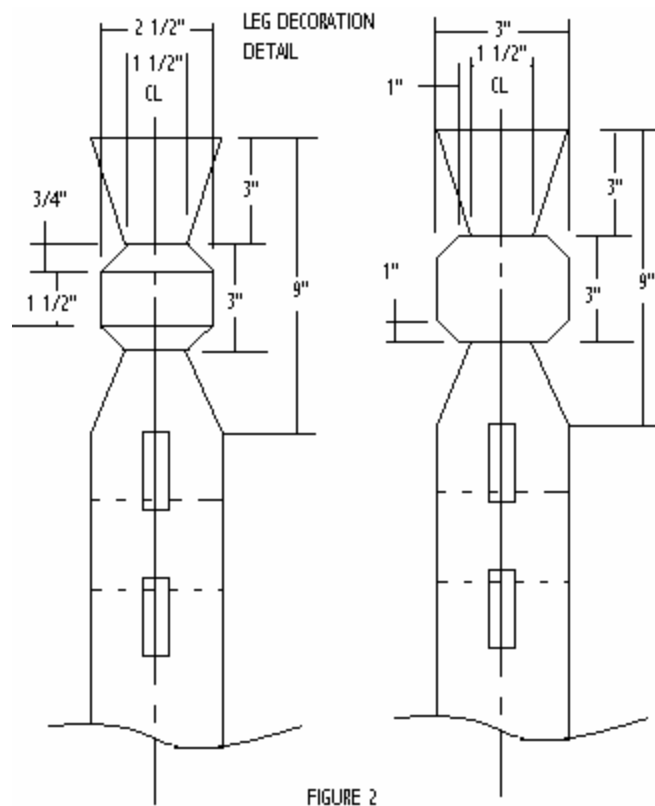
Lets start with the legs. The legs have 4 separate operations. They are the most difficult part of this project. But, with a little care, I am sure you can do a great job.

1. The square holes (mortises) for the rails (tennons) to slide through.
2. The decorative cuts at the top of the legs.
3. The taper down all 4 sides.
4. Sanding

1. To cut the square holes lay them out according to figure 1. Use a drill press and a $\frac{3}{4}$ " bit to plow out most of the material, then a chisel to make them square. Don't forget to cut the little insert that allows the rails to set slightly into the legs. This can be done with just a chisel, but do it now, before you taper the legs. One of the first things you are going to notice is that you are going to have three 2" tennons going into a $5\frac{1}{2}$ " space. 1"x6" dimensional lumber is actually $\frac{3}{4}$ "x $5\frac{1}{2}$ ". So in order to use standard lumber, your mortise holes will cross in the center. This actually makes the bed hold together stronger than before, as the rails all tie together. The sides cannot be removed without removing the ends.



2. These cuts are easiest done with a bandsaw. A handsaw will do the job, but it's a pain. Note: This is a good time to ask your wife if you can buy that bandsaw you wanted. Choose the design you like, figure 2. Both of these designs are period, or you can come up with your own. Draw the design right on the leg and use your saw to cut them out. I found it easiest to cut everything on one side, then turn the leg 90 deg. And draw that side and cut it there.



- To cut the taper, no ifs, ands, or butts, you need a tapering jig. You can make one, or buy one. Woodworking shops should know what you're talking about. Aluminum jigs should cost about \$10. Use the jig to taper the legs from the bottom of the decorative cuts down. See figure 4. Keep in mind; when you make the first cut, you have a straight edge against the rip fence. When you make the second cut, you have a tapered edge against the rip fence. So you must adjust the jig to cut twice as deep to get the same taper. You should remove a taper so that the bottom of the leg is $2\frac{1}{4}$ " and the top of the highest mortise is 3". Therefore you have to remove $\frac{3}{8}$ " on each of the four sides. See figure 3.
- A palm sander will do a decent job of cleaning up all of your cuts and blade marks. I used 60 grit paper first, then 150 grit, then 220 grit to finish the job. Do not put a finish on anything until all of the pieces are ready. You will need to adjust a little bit first.

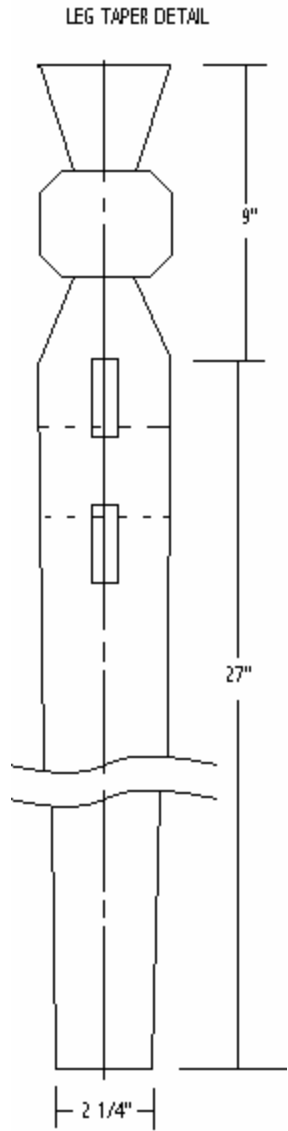


FIGURE 3

Step Two:

The second step is to make the two end rails. There are easy 3 operations to make them.

- The main cuts.
- Sanding
- Wedge holes

- Take one 1"x6"x61" board and make the cuts in figure 4. This makes a tenon to fit into the single hole side of the legs. Do the same for both ends. The second board is done the same

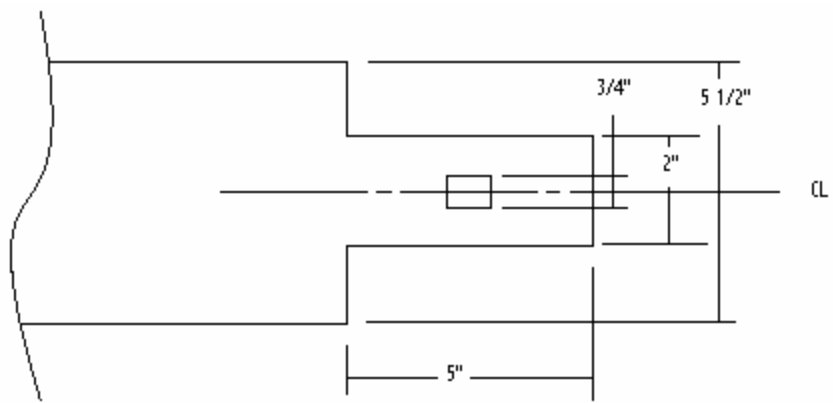


FIGURE 5

- way.
2. Sand everything before cutting the mortise holes for the wedges.
 3. Put the tennon from the rail through one of the legs, you may need to adjust the hole in the leg with a chisel and/or a rasp so the rail fits in easily, but not loosely.

Note: the rails go in through the side with the insert; the wedges will go on the clean side of the legs. With the rail through the leg, draw a line on the outside where the rail meets the leg as in figure 5. Put the same rail tennon through each and every leg. Then repeat with each rail. This gives you 4 lines on each tennon that should be very close together if not on top of each other.

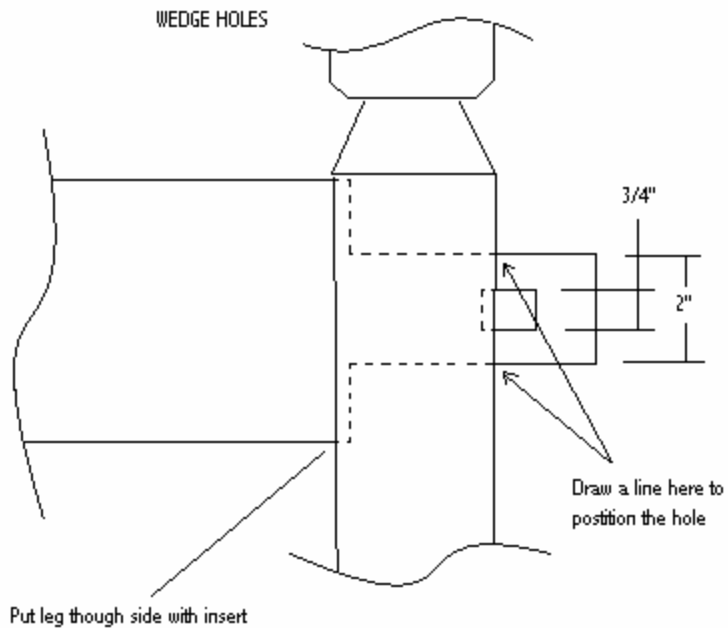


FIGURE 5

Your mortise holes need to overlap the innermost line by at least a 1/4 inch, centered on the tennon. Use a 3/4" spade or forstner bit to drill the hole. Then square it up with a chisel. After you cut the wedges, you will be putting an angle on the outside edge of the hole, but it's easier to do that later in step 6.

Step Three:

Third is the construction of the side-rails, which take 5 operations to complete.

1. The mortise holes for the slats.
2. The tennons for the legs.
3. Sanding.
4. The mortise holes for the wedges.
5. The notches for the end-rails. To make the mortise holes for the rails, layout the centerlines for each, then layout the holes as in figure 6. Once your holes are drawn, take the board to your drill press and use that 3/4" bit once again to cut a series of holes to remove most of the material, then square them with a sharp chisel. Remember, the center rail is larger and the hole is 4 1/2" long while the others are only 4" long.

SIDE-RAIL DETAIL

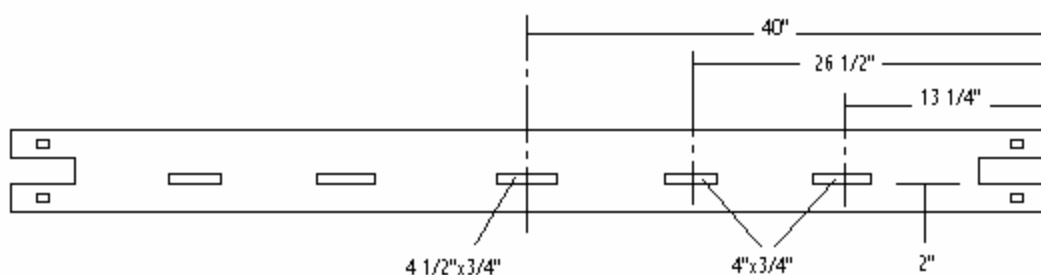


FIGURE 6

SIDE-RAIL ENDS

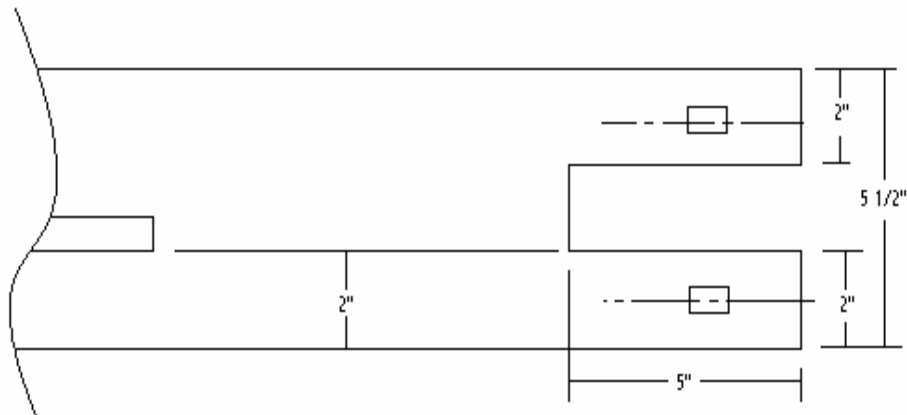


FIGURE 7

2. Take one of the two 1"x6"x80" boards and lay it out according to figure 7. Be sure to layout the 2" tennons from each side rather than measuring from one side. The 2" is more important than the center in this case. Like the rails in step two, the ends have tennons, only two at each end this time. Repeat for all four ends on the two boards.
3. Put the tennons from the rail through one of the legs, you may need to adjust the hole in the leg with a chisel and/or a rasp so the rail fits in easily, but not loosely. Note: the rails go in through the side with the insert; the wedges will go on the clean side of the legs. With the rail through the leg, draw a line on the outside where the rail meets the leg as in figure 5 on the end rails. Put the same rail tennon through each and every leg. Then repeat with each rail. This gives you 4 lines on each tennon that should be very close together if not on top of each

NOTCH IN SIDERAILS

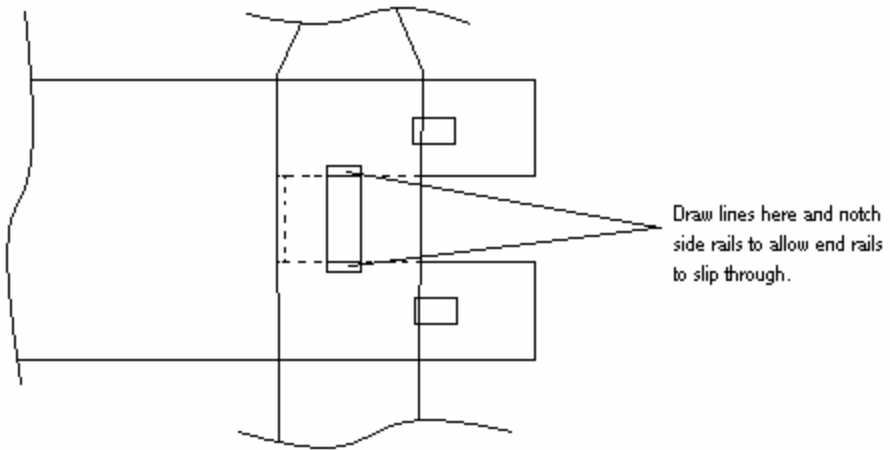


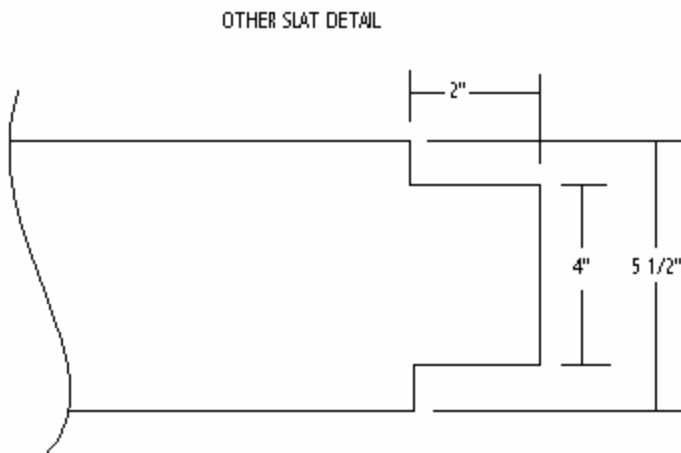
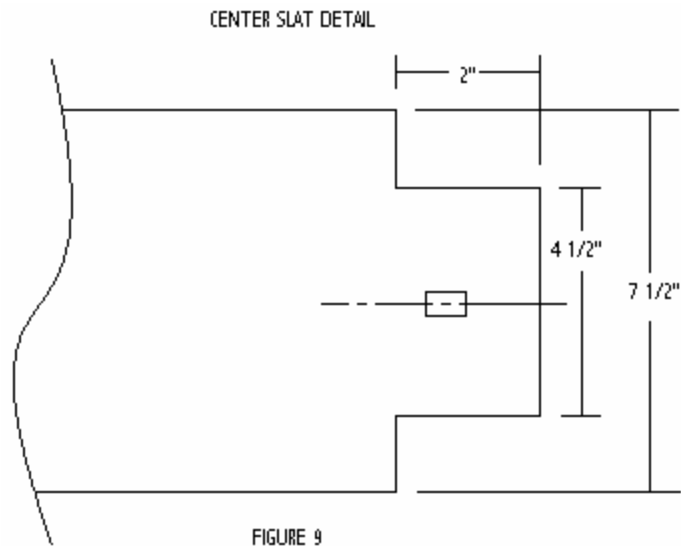
FIGURE 8

- other. Your mortise holes need to overlap the innermost line by at least a 1/4 inch, centered on the tennon. Use a 3/4" spade or forstner bit to drill the hole, then square it up with a chisel. After you cut the wedges, you will be putting an angle on the outside edge, but it's easier to do that later.
4. Put the tennons from the rail through the legs again. This time you need to use your pencil to mark where the head and foot boards go through the legs, Figure 8. A small amount of material has to be removed. Once again, use each of the rails in all four legs. Use a jig saw to remove the two notches on each end.

Step Four:

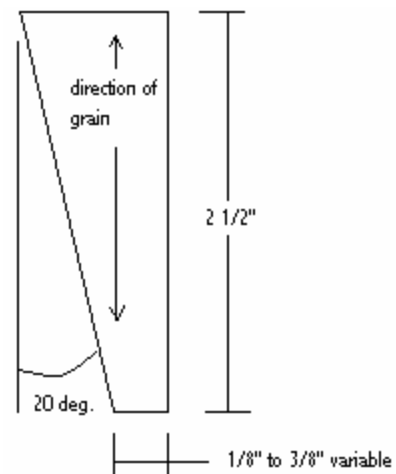
Okay, you have done all of the hard work. Lets make some slats.

1. The center slat first because it's different from the rest. Take your 1"x8"x58" board and lay it out as in figure 8. Cut the shoulder with a jigsaw or a bandsaw.
2. Sand everything before cutting the mortise holes
3. Put the slat through the center tennon in each side rail and draw your line. You might need to adjust the mortise on the side-rail to fit. Use a $\frac{3}{4}$ " bit to cut your hole and square it up with a sharp chisel. Again, the angle on the wedge hole will be done later.
4. Cut the remaining four slats from the 1"x6"x58" boards, figure 9.
5. Sand everything.
6. There are no holes to cut for wedges on these boards, however, you still want to make sure the end or each slat fits easily into each of the eight mortise holes on the side-rails. Some adjustments to the side-rails with a rasp and chisel are inevitable.



Step Five:

Okay, time to make some wedges. This is easy, but you have to remember a couple of things. First of all, wood is not a stable material. It warps, it swells, it shrinks, it bends. Also, your mortise holes are not going to be exactly the same everywhere. Therefore, you need a number of wedges, some thicker, some thinner so that on any given day you can



find a wedge to fit any given mortise. So make more wedges than you need. Fourteen are needed to put the bed together, so you should have a minimum of 20-30 assorted wedges. They are not big, and a small bag will hold them all. I recommend a small wood or rawhide mallet to help with assembling and disassembling the bed. I keep one in the wedge bag. Here is a quick and easy way to make wedges. Take some of your scrap wood from cutting the boards to length and cut 2½" strips out of it. Make sure the grain runs the short way across the 2½" so it goes the correct direction on your wedges, figure 10. Using a table saw, set your miter gauge to about 20 degrees and cut a wedge so that the small tip of the wedge is anywhere from 1/8" to 3/8" thick. Reset the miter to 0 degrees and make another wedge, the angle is already there from the last cut. Turn back to 20 degrees and repeat. Make a bunch of wedges, some thicker, some thinner. You can't really make too many. You might even need a couple really thick ones. It depends on your individual bed and how accurate your cuts were earlier.

Step Six:

Fear not, the end is in sight. Remember all those holes for the wedges? Well the outside edge needs to have a taper to match the wedge. The easiest way I have found to make the taper is with a nice sharp chisel and a wedge. Take the chisel and start removing material from the side of the wedge hole closest to the end of the board. On the center slat you want the taper on the same side of the board so both wedges go in from the top. On the others it doesn't matter. Keep your chisel at an angle. You are going to need to remove about 1/8" from the top of the mortise hole down to 0" at the bottom, figure 11. Use the little wedge occasionally to check the angle. It should be straight in the hole when the two angles are against each other. The holes through the legs do not get a taper.

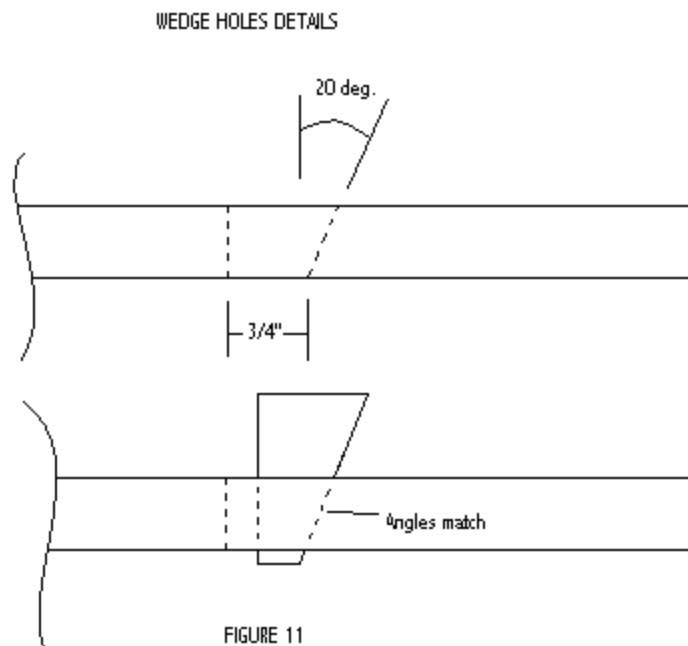


FIGURE 11

Step Seven:

Okay, let's see if we can't wrap this up. The bed should all go together. If something is too tight, adjust with a rasp and/or chisel. Make sure that each board will fit in each spot. Trust me, it is easier to spend the time now making them interchangeable than it is to try and find the right board for the right hole after setting up your pavilion in the rain, after dark....

Once you are happy with the fit, check your sanding. It is time to touch it up. You can sand, scrape, or whatever you want for a finish. I sanded mine. Why? Because; my Lady doesn't want a splinter at 2 a.m. on the way to the privy. Sure sanding is not period. But, practical counts too, especially in something that is going to be used a lot.

There are a lot of ways to put a finish on the bed and you can decide what you wish to use. I used 2 coats of tung oil and 2 coats of beeswax on the beds I have made. Although, beeswax can make the boards extremely slippery and you should not lean them on end against the wall. Or they will crash to the floor. Other methods you might use are boiled linseed oil, shellac, stain, polyurethane, and wax. I recommend something to seal the wood and make it last.

Step Eight:

Wait a minute; there is no step eight. You're done! Clean up the shop. Toss a futon on your new bed and try it out. Enjoy the bed and feel free to look me up at Pennsic. I can usually be found around the Barony of Andelcrag area N-07

Notes from a few years down the road:

Well, here it is three or four years later. The bed has seen a lot of use, some local events, three Pennsics. One main comment, for a weekend event, it's fine, no problem, but after a week at Pennsic, the slats begin to hurt. To fix the issue I added a ledge under the slats on the side rails, and cut more slats to fill in the holes. To preserve the look, these fill ins go from side to side between the regular slats, so they are a little shorter. With a futon on it, you can't tell the difference. The other choice, was to put a piece of hardboard or plywood over the slats, but then you have to transport the larger piece of plywood. Individual slats are easier to transport.

I hope you enjoy making this as much as I did.

A handwritten signature in black ink that reads "Rhys". The letters are stylized and connected, with a long vertical stroke for the 'y'.

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