Shaker-Style Bed

The Shakers lived their lives apart from the "world," what they called life outside their religious communities. They did a lot of things differently from the "world," including sleep. Because the Shakers were celibate, they had little need for double beds and used them only to save space. Two men, women, or children would sleep together in these.

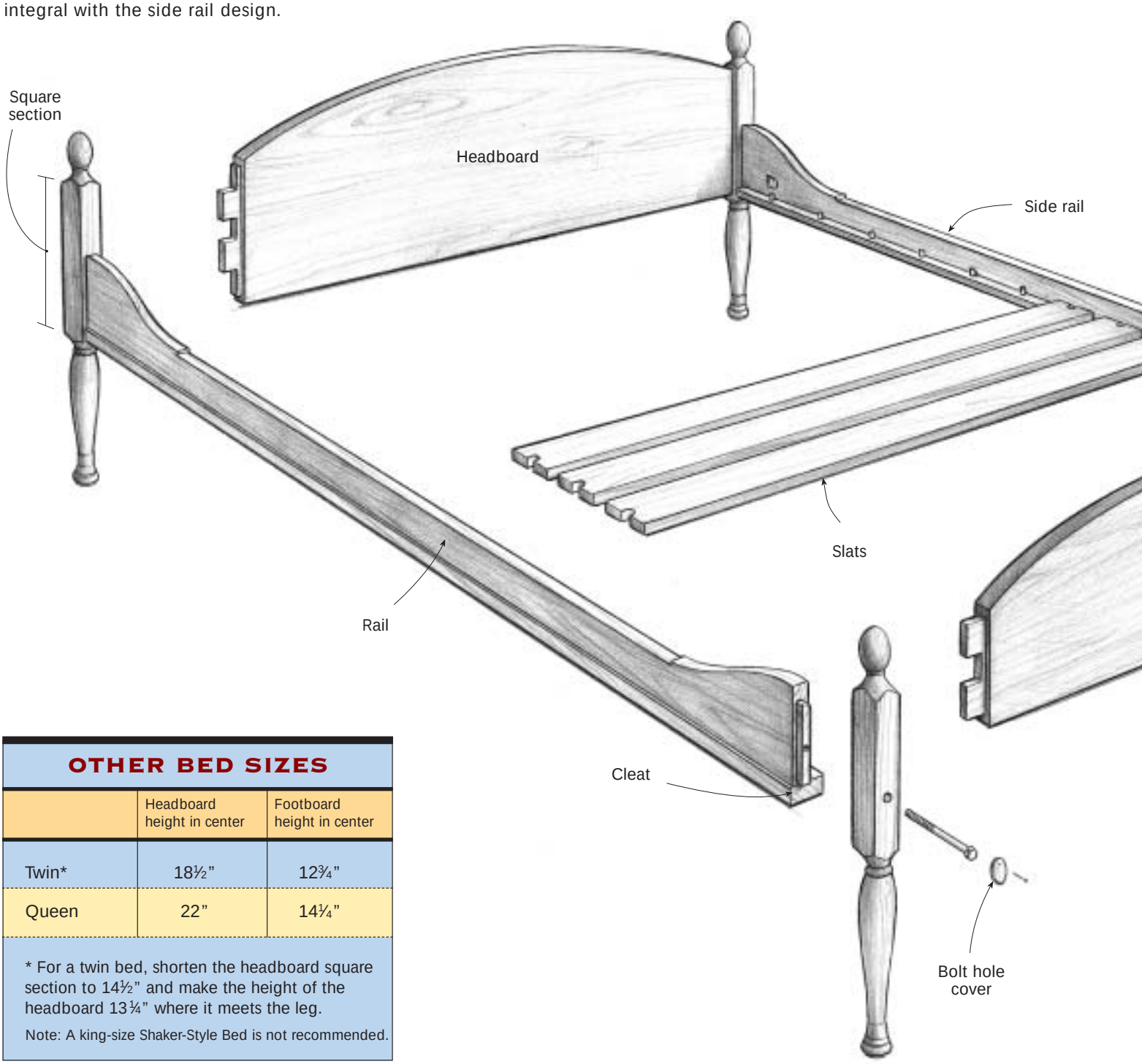
Many Shaker-designed single beds did not break down. The side rails were tenoned into the legs just like the headboards and footboards. Almost all of the beds had casters on the legs. This made it easy to move the bed out of the way when sweeping the floors. The beds were also relatively high off the ground to keep out of the cold drafts near the floor.

This bed is not a copy of a particular Shaker bed. Instead, I have borrowed elements from a number of Shaker beds I have seen. Some of my construction details remain faithful to traditional Shaker construction. But I have made concessions to modern living and to contemporary woodworking techniques.

I chose to make this a full-size bed, which is more useful than the 28-in.- to 34-in.-wide and 70-in.- to 72-in.-long originals. I also omitted the casters. I hesitate to say that these changes make the bed better, but they certainly make it more familiar and comfortable for us today.

Shaker-Style Bed

THE BASIC STRUCTURE of the Shaker-Style Bed is similar to the First Bed. However, the legs are turned, the headboard and footboard planks do double duty as structural rails, and the cleats are integral with the side rail design.



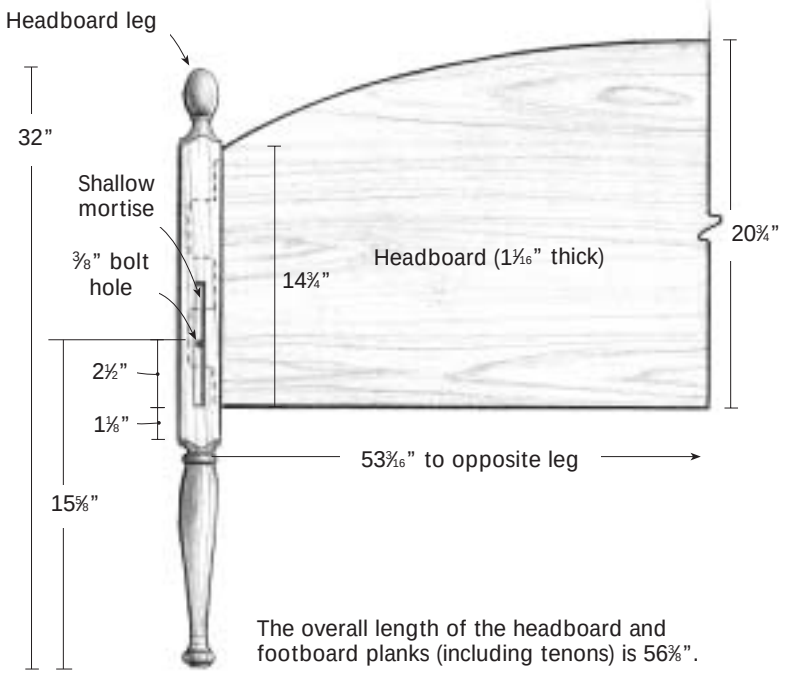
OTHER BED SIZES

	Headboard height in center	Footboard height in center
Twin*	18½"	12¾"
Queen	22"	14¼"

* For a twin bed, shorten the headboard square section to 14½" and make the height of the headboard 13¼" where it meets the leg.

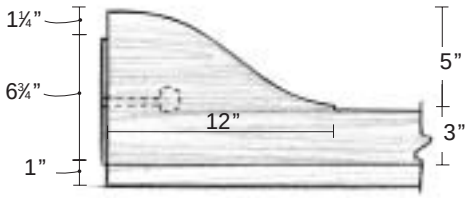
Note: A king-size Shaker-Style Bed is not recommended.

HEADBOARD DETAILS

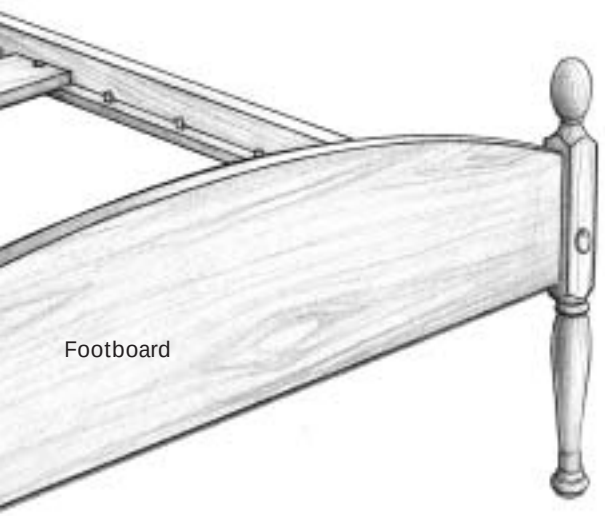


The overall length of the headboard and footboard planks (including tenons) is 56⅜”.

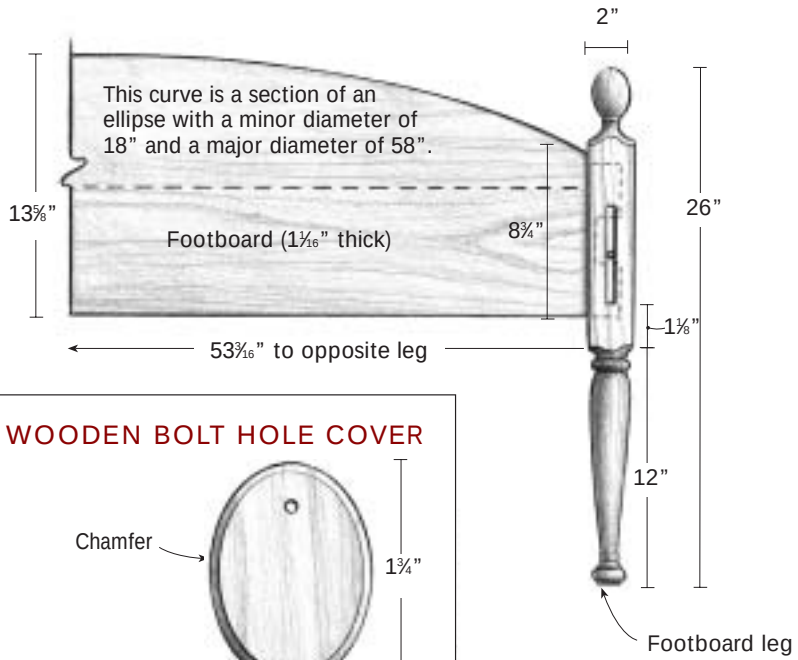
HEADBOARD END OF SIDE RAIL



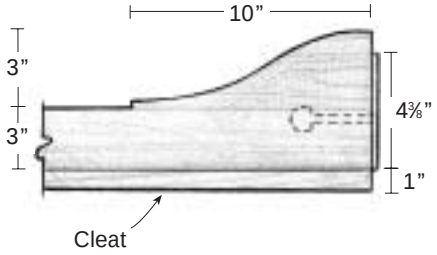
Rails are 1/16” thick.



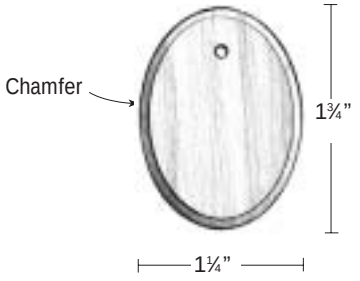
FOOTBOARD DETAILS



FOOTBOARD END OF SIDE RAIL



WOODEN BOLT HOLE COVER



Building the Bed Step-by-Step

CUT LISTFOR SHAKER BED

Headboard and Footboard		
1	Headboard plank	1 1/16 in. x 20 3/4 in. x 56 3/8 in.
1	Footboard plank	1 1/16 in. x 13 5/8 in. x 56 3/8 in.
2	Headboard posts	2 in. x 2 in. x 32 1/4 in.
2	Footboard posts	2 in. x 2 in. x 26 1/4 in.
Side Rails		
2	Side rails	1 1/16 in. x 3 in. x 76 1/2 in.
2	Ogees for headboard ends	1 1/16 in. x 5 in. x 12 in.
2	Ogees for footboard ends	1 1/16 in. x 3 in. x 10 in.
2	Cleats	1 in. x 2 5/16 in. x 76 in.
15	Slats	3/4 in. x 4 in. x 54 1/8 in.
Hardware		
30	Dowels (for slat pins)	5/16 in. x 1 1/2 in.
4	Hex-head bolts with nuts and washers	
4	Bolt hole covers	1 1/4 in. x 1 3/4 in. x 1/4 in. thick
#6 x 1 5/8-in. screws, as needed		
#6 x 3/4-in. roundhead brass screws, as needed		

These dimensions are for a full-size bed with a mattress up to 8 in. thick. You may have to adjust your dimensions to suit the bed size, the mattress size, or any differences in wood dimensions.

Tip: The moisture in yellow glue swells wood slightly along joint edges. Wait 24 hours before smoothing the surfaces to give the moisture a chance to evaporate and the wood to settle back down.

ALTHOUGH THIS BED looks very different from the First Bed on pp. 18-35, the overall approach to building it is the same. To start, you work on the headboard and footboard together. Then move on to the side rails and finally the mattress support. The turned legs are not essential to the construction, but they are to the design. You can make the bed with straight or tapered legs, but it won't look as nice.

Making the Headboard and Footboard

Milling the headboard and footboard planks

1. Mill up the pieces for the headboard and footboard planks.
2. If you're not working with a single board plank, glue the pieces into slightly oversize planks.
3. Cut the planks to size, making sure the edges are parallel and the ends square.

Cutting the tenons

This bed doesn't have a separate headboard and footboard rail to provide structural strength, so the planks themselves need structural tenons. However, 8-in.- to 14-in.-wide mortise-and-tenon joints would break apart due to seasonal wood movement. The traditional solution is to make a divided tenon (see "Headboard and Footboard Joinery" on p. 42).

1. Cut the headboard and footboard plank tenon shoulders with the tenoning jig described in "A Tenoning Jig" on p. 24 and a 4-in.-long straight bit. To use the jig with the wide headboard, remove the vertical fence from the workpiece support. You'll have to cut the tenons a portion at a time (see photo A).

Photo A: One good way to cut the full-width tenons on the headboard and footboard is with the tenoning jig on p. 24 and a 4-in.-long router bit.

2. Lay out the sections of tenon that will stay full length and the short ¼-in. haunches.
3. Cut away the waste on the bandsaw and then pare away all of the haunch tenon on the very top and bottom to leave shoulders.

Laying out and cutting the curve on top of the planks

The headboard and footboard on this bed have elliptical curves. If you're unfamiliar with ellipse layout, see "An Ellipse Layout Jig" on p. 117. You can also use a simple curve as for the First Bed.

1. Lay out either a simple curve or an ellipse along the top edge of the board.
2. Cut the curve out on the bandsaw, keeping to the outside of the line.
3. Clean up the sawn edge with a plane or sandpaper.

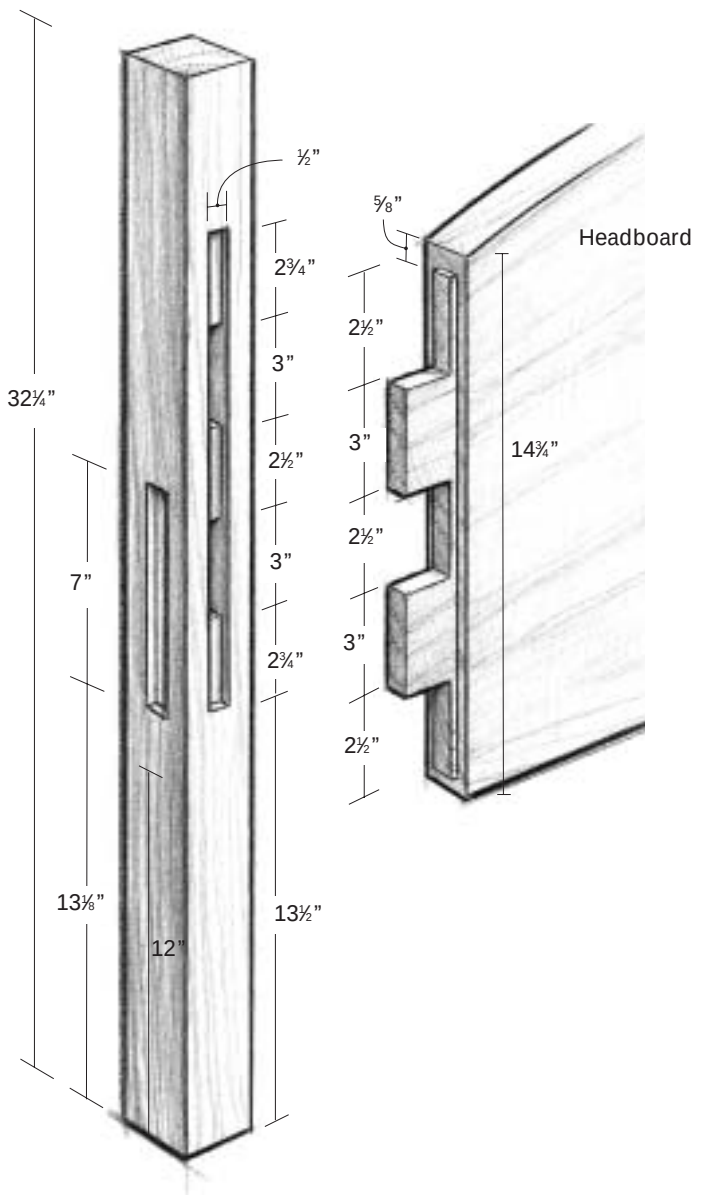
Cutting the leg joinery

1. Mill up the leg blanks. The cut list dimensions are ¼ in. longer than finished. The extra ¼ in. on the top of the legs is for the turning centers on the lathe—you'll cut it off and smooth it to shape later.
2. Lay out the mortises for the headboard, footboard, and side rails as shown in "Headboard and Footboard Joinery" on p. 42. Remember that the left and right legs are not identical, though they are symmetrical.
3. Mark lines that indicate the end of the sections that remain square all the way across the

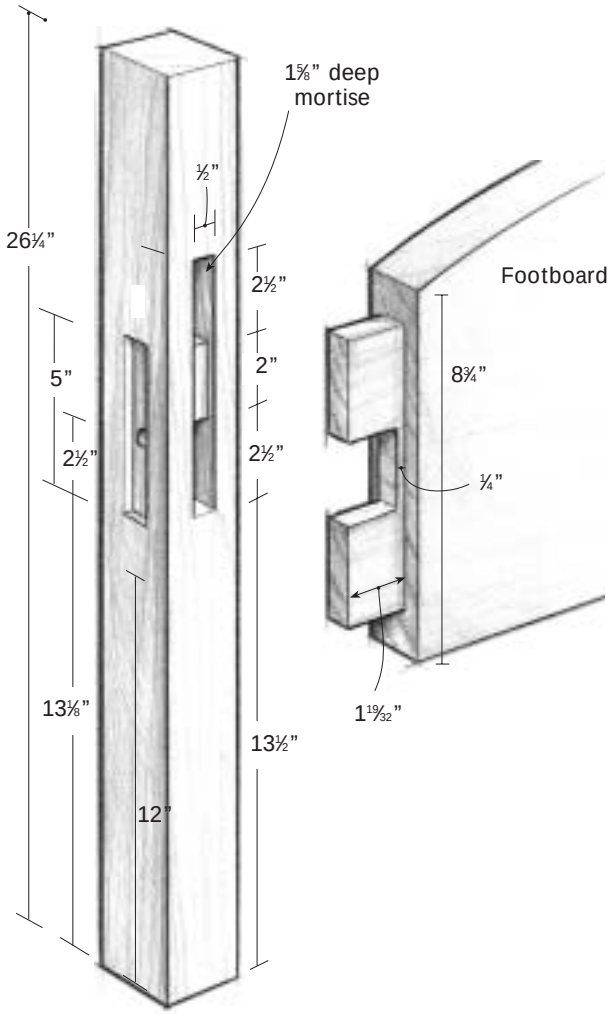
Headboard and Footboard Joinery

Double tenons are the traditional way to join a wide headboard to legs. Wood movement may still cause cracking because the overall movement of the plank is still constrained. But the joints should remain structurally sound. To minimize cracking, make sure the wood is very dry. The haunches are not glued and help keep the headboard from warping.

HEADBOARD LEG BLANK AND TENON



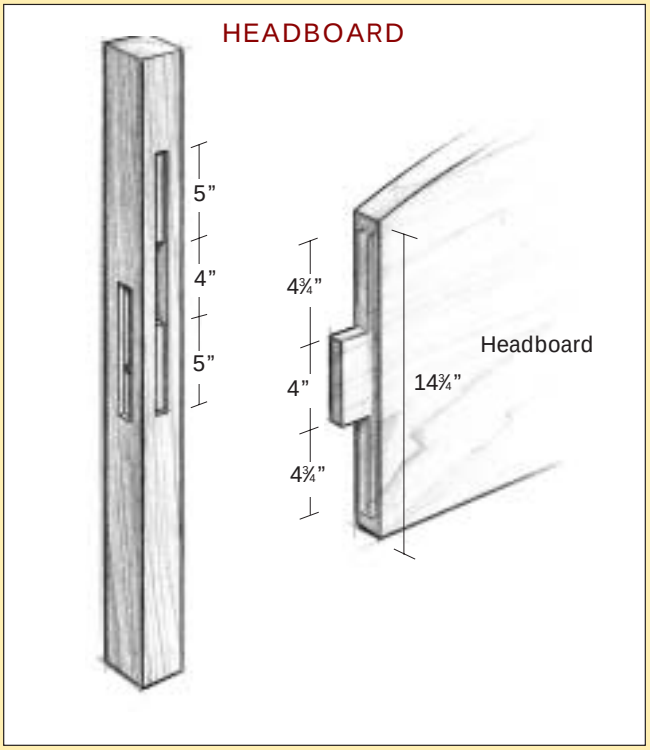
FOOTBOARD LEG BLANK AND TENON

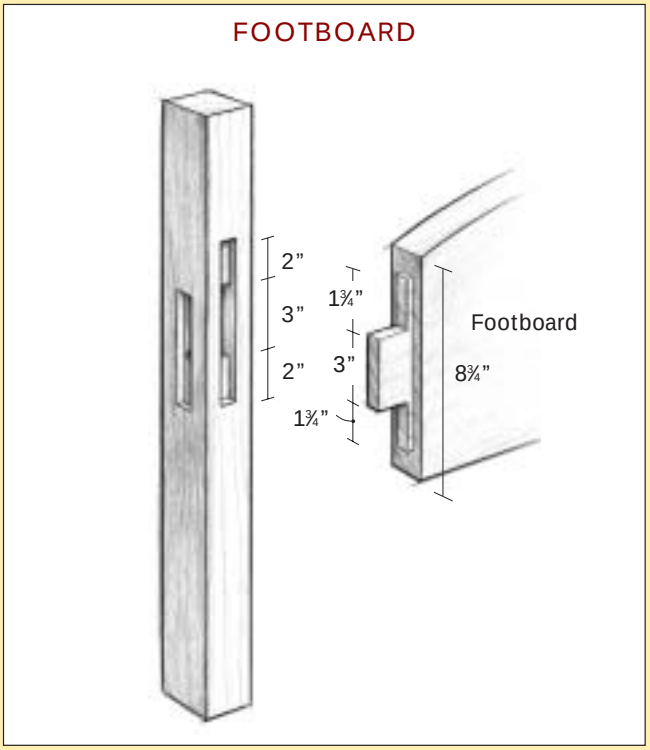


Alternative Joinery For Headboard And Footboard

The headboard and footboard planks are structural on this bed. While the traditional construction method is a divided tenon, wood movement may cause cracking because the overall movement of the plank is still constrained. An alternative method is to use a single tenon in the center. This design allows for unconstrained movement and little chance of cracking.

The disadvantage of this technique is that the joint may not keep the headboard plank as tight against the legs. It also offers less glue surface (and strength) than the divided tenons. Using fat haunches (shallow tenons, really) without glue to either side of the tenon helps keep the headboard from warping.





blank at the top and bottom. You need these marks when turning.

4. Cut the side rail mortises 9/32 in. deep, just deep enough to keep the rail from twisting or moving down. The best tools for the job are a plunge router and the mortising block described in “Mortising Jig for Routing Small Workpieces” on p. 23.

5. Also cut the headboard and footboard mortises 9/32 in. deep over their full length. Then go back and cut the two full-depth mortises 1⅝ in. deep.

6. Drill the ¾-in.-diameter, ⅜-in.-deep counterbore for the bed bolts on the outside of each leg.

Tip: Use wood with straight, even grain for the legs. You don't want much grain runout on the relatively long and thin legs because it will weaken them considerably.

7. Drill the 5/16-in. holes for the 5½-in. hex-head bed bolts through the legs, centered in the counterbore. To ensure that the bolt hole is straight, drill in from both sides and meet in the middle. It's the long way around to do it, but it ensures a good result.

Turning the legs

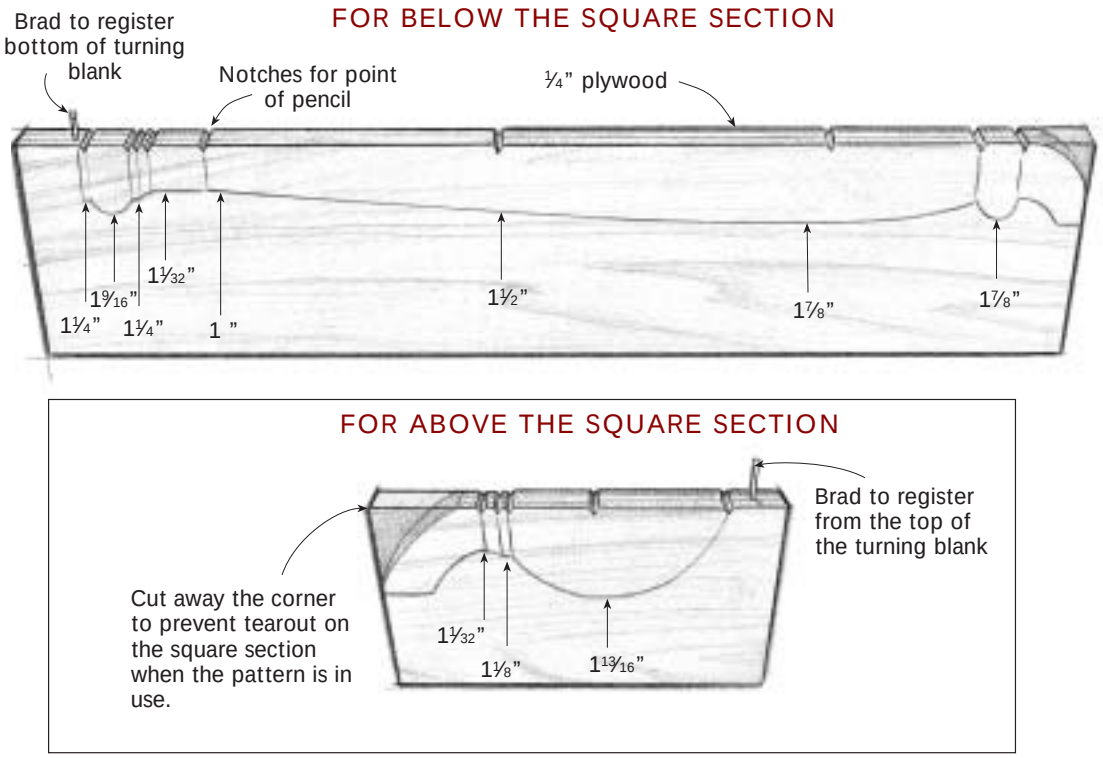
1. Make up full-scale patterns of the upper and lower parts of the turnings on pieces of ¼-in. plywood, 2½ in. wide and as long as the section involved (see "Making the Turning Pattern").
2. Set up the blank in the lathe.
3. Set the tool rest in position for roughing out the cylindrical lower leg. Rotate the leg blank by hand to check that the tool rest won't interfere with the blank when it's spinning.
4. Rough out the top and bottom of the blank into cylinders with a roughing gouge, staying about ½ in. away from the edges of the square section.
5. Clean up the transition between cylinder and square section using a gouge, working slowly to the line. Start the cut with the tool up on edge, then roll the gouge flatter toward the bottom of the cut, keeping the bevel rubbing against the spinning leg (see photo B on p. 46). If you just present the tool flat (like a scraping tool), you're likely to tear a chunk off the edges of the square section.
6. Using a pencil, transfer the notch locations from the pattern to the spinning blank (see photo C on p. 46).
7. Using a parting tool, turn notches in the blank where you have marked it to the various diameters (see "Leg Turning Strategy"). Note that you don't do this on every line you

Making the Turning Pattern

Plywood patterns with notches to hold the tip of a pencil help you mark the turning blank accurately while it's spinning in the lathe.

MAKING THE PATTERN

1. Draw the profiles of the turning on the plywood. Either sketch it out by hand or trace an enlarged photocopy.
2. Draw perpendicular lines out to one edge of the pattern. These will later serve as depth-of-cut and turning-detail guides.
3. At each of these lines, cut a shallow notch with a knife or a saw, just big enough to hold a pencil point.
4. Mark the diameter of the leg at each of the indicated points on the pattern.



marked. Some of the lines indicate the location of a change from one detail to another, and you'll have to turn next to them. On others, such as the sides of the bead below the square section, you can't get a parting tool or calipers into the small space. Size these by eye.

8. Where you can, set your calipers for each desired diameter and reduce the blank with the parting tool until the calipers just fit over the leg at that point (see photo D on p. 46).

9. Connect the grooves with the parting tool, following the shape on the pattern. Use whatever turning tools you prefer (see photo E on p. 47). Watch the flow of the curves and the overall shape of the leg to make sure you are doing what you want. Correct any problems with a gentle touch.

10. Leave a little pad of wood under the bottom bead for the tailstock to bite into. You can remove the pad later and replace it with a furniture glide, or you can just leave it.

11. Add definition to the turning by touching the sharp tip of a skew chisel to the transition points. Just a touch will do it.

12. Sand the spinning blank with the coarsest grit necessary, working your way up through 400 grit. Be careful not to sand away the crisp edges of the transition between square section and turning. A good technique is to wrap a 1-in. dowel with sandpaper and work it over the transition while holding on with two hands (see photo F on p. 47).

13. Burnish the smooth turning with a handful of clean shavings (see photo G on p. 48).

14. Saw off the waste at the very top of the leg above the finial. Then sand to complete the shape.

15. Smooth the faces of the square sections. Because it's important to keep the faces perfectly flat, use a well-tuned handplane. A sanding block that doesn't overhang the edges will also do a good job, though it's more likely to round over the edges.

Assembling the headboard and footboard

1. Fit the headboard joints using a shoulder plane to trim the tenons to size (see photo H on p. 48). Strive for a snug fit. The joint should go together with some effort, but heavy hammering should not be necessary.

2. Glue up the headboard and footboard. Spread glue only in the deep mortises; the haunches get no glue at all. You'll need at least two clamps to get the legs tight to the

Tip: The marks you put on the ends of the pommel should be easily visible when the blank is spinning.

LEG TURNING STRATEGY

Use the patterns to reduce the diameter of the turning blank to the desired dimension in a few select places. This will allow you to envision the final leg shape as you turn by "connecting the dots," and help you make duplicates accurately.

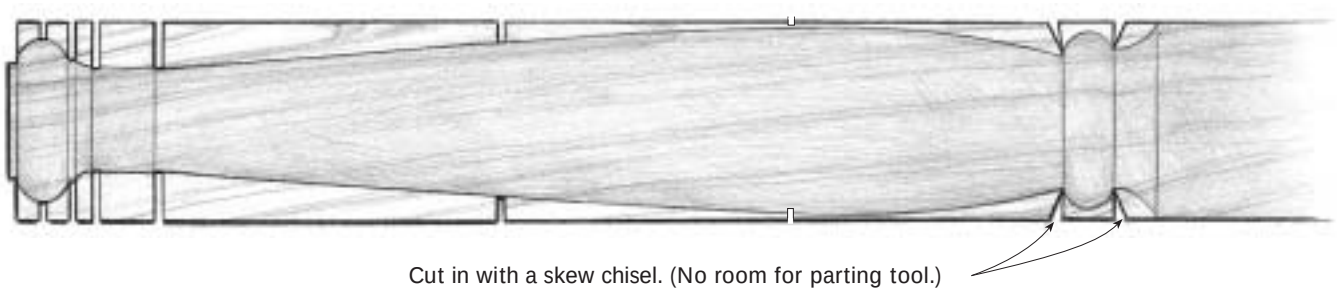


Photo B: After roughing out the cylinder below the joinery block, you have to cut the transition from square to round carefully. The gouge should be up on edge as you start the cut at the line.

Photo C: Touching a pencil point lightly in each of the notches on the turning pattern leaves an easily visible mark on the round leg blank. These marks will guide your cuts.

Photo D: Hold the calipers with one hand and the parting tool with the other hand. The calipers will drop over the sized notch when you turn to the correct diameter.

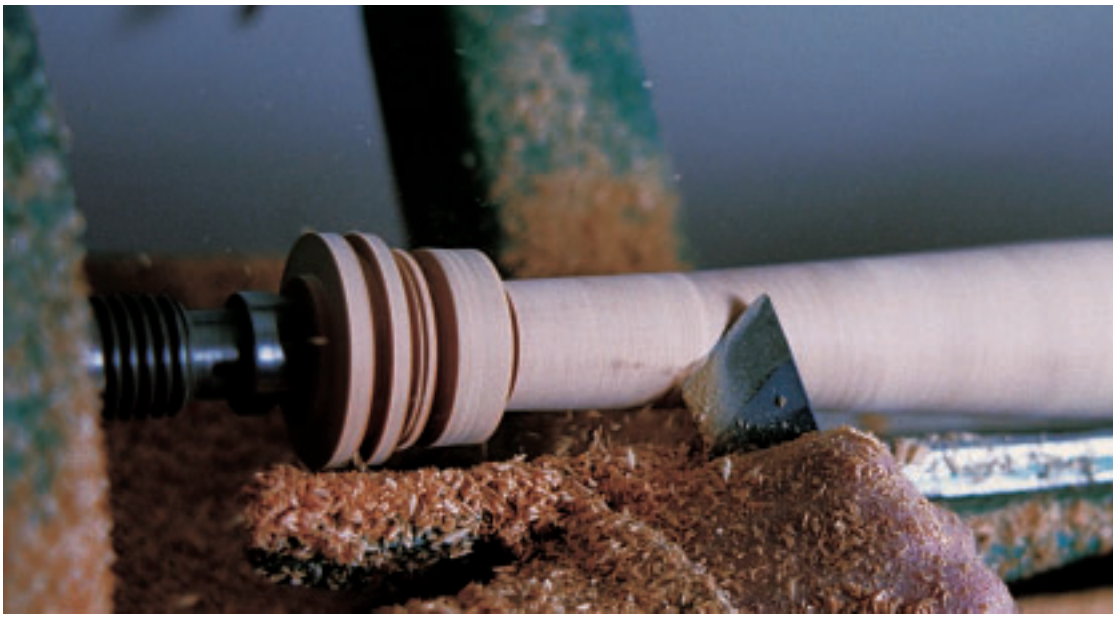


Photo E: After roughing out the shape of this part of the leg with a gouge, finish up the cut with a skew chisel.

tenon shoulders. Check that the tenons are not too long for their mortises. They should be about 1/32 in. short. Otherwise when you glue up, the joint may not come fully together.

Making the Side Rails and Slats

1. Mill up the 3-in.-wide rails, getting a flat and smooth surface on both edges because you'll have glue joints on both.
2. Crosscut to 77½ in. long, which leaves 1 in. of extra length.
3. Smooth the top edge of the rail with a handplane now so you won't have to do this with the blocks attached. You can do this later with a scraper and sandpaper, if you prefer (or if you forget, as I did).

Adding ogee blocks to the side rails

1. Rip the four ogee blocks to width, 5 in. for the headboard blocks and 3 in. for the footboard blocks. Find boards that match well in color and grain so the joint between the blocks and the rail isn't obvious. Also make sure the end grain of the block matches that of the rail (see "Grain Orientation on the Side Rails" on p. 49).

Photo F: Sand the transition from square to round using a sanding dowel so you don't blur the edges sanding by hand.

Photo G: **Burnish the leg with a handful of clean shavings after all the sanding is done.**

2. Joint the bottom edge of the stock straight and smooth.
3. Cut the headboard blocks to 12½ in. long and the footboard blocks to 10½ in. long. This leaves ½ in. extra: ¼ in. for waste and ¼ in. for the tenon.
4. Lay out the ogee shape on each block and bandsaw to shape. Smooth the rough edges with spokeshaves, scrapers, and sandpaper.
5. Line up the blocks with the ends of the rails and glue them in place using cauls made from the cutoffs (see photo I on p. 50).
6. Cut the rail ends square and to their finished length of 76½ in. after the glue dries.

Cutting the stub tenons

The side rails use a short tenon instead of two dowels to align and reinforce the rail-to-leg joint against twist and shear forces.

Photo H: **Trimming the cheeks of the tenons to fit the mortises is easy with a shoulder plane. Note that you cut across the grain.**

1. Rout the stub tenon shoulder. Either use the jig shown in "A Tenoning Jig" on p. 24, or just rout rabbets on both sides of each end with the base of the router running on the face of the rail.
2. Cut away some of the tenon to create the top shoulder. Don't do this on the bottom because the added cleat will create the shoulder on that side. Chisel the remainder flush with the shoulder surface.

Drilling for the bed bolts and making recesses for the nuts

1. Locate the bed bolt holes 2½ in. up from the bottom of the rail (not including the cleat). This puts the nut in the full length portion of the rail and not in the ogee blocks.
2. Drill in from the end of the rail for the bolt holes with a ⅜-in. drill bit using a doweling jig for accuracy.
3. If you need to extend the hole deeper than the jig will allow, drill the rest by hand—it will follow the existing hole well.
4. Rout or drill and chisel a recess for the nut, as described in "A Template for Routing Nut Recesses" on p. 32. The only difference is the location for the recess. The flat side of the recess should be 3¼ in. from the shoulder of the rail and centered on the bolt hole.

Making and adding the cleats to the rails

The cleats that support the slats on this bed are screwed to the bottoms of the rails instead of to the sides. Try to use boards that match the color and grain of the rails.

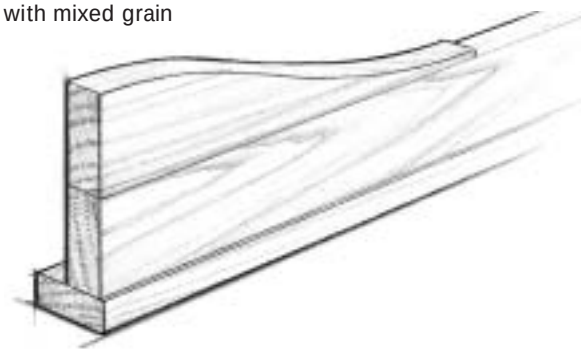
1. Cut cleats exactly to the length of the side rails between the tenons.
2. Plane or sand the outside edge of the cleats smooth.
3. Drill a series of pilot holes for # 6 by 1⅝-in. screws to attach the cleat to the side rail. Drill from the bottom, ⅝ in. from the outside edge of the cleat and every 4 in. If you start 1½ in. from each end, you should wind up with 19 screw holes (see "Cleat Details" on p. 51).
4. Drill the holes on the top face of the cleat for the dowel pins that hold the slats in place. These are 5⁄16-in. holes, ¾ in. deep. Locate the holes ⅝ in. from the inside edge of the cleat, spaced every 5 in. starting 2½ in. from each end.
5. Squirt a little glue into each hole, then pound in a 5⁄16-in. by 1½-in. dowel.
6. Scribe a line with a marking gauge 1⁄16 in. from the outside edge of the cleat. This is the reference line along which you glue the rail.
7. Spread a light film of glue on the bottom of the side rail, keeping glue away from the outside edge to minimize the squeeze-out.
8. Place the rail on the cleat along the scribed line and flush with the ends of the cleat. Clamp in place.

Tip: To pare the very top edge of the tenon shoulder flush, tap down with a ¾-in. chisel, flat side against the shoulder. The shoulders of the tenon will keep the chisel aligned.

GRAIN ORIENTATION ON THE SIDE RAILS

Ideally, the grain on the different parts of the side rail should run in the same basic direction.

Boards with mixed grain



Boards with grain running in same direction

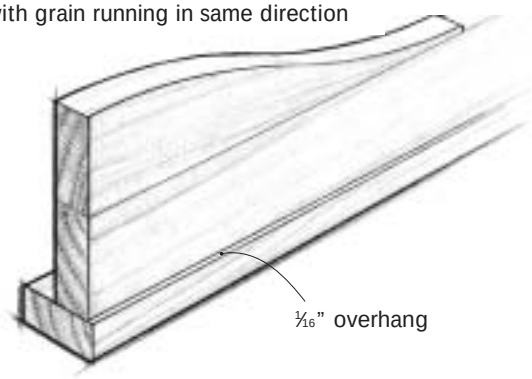
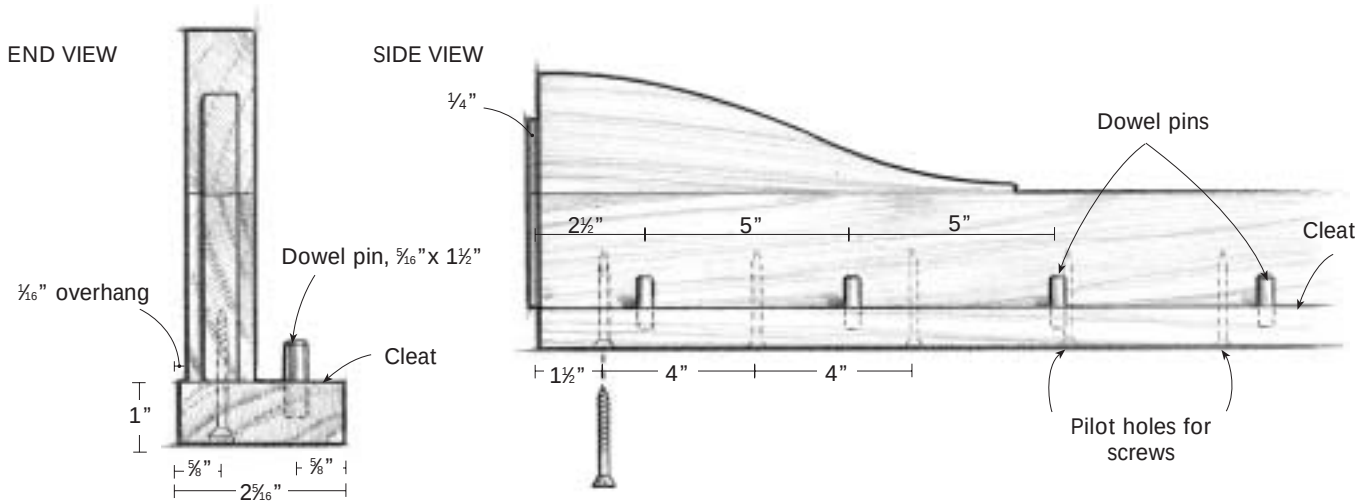


Photo I: It's easy to clamp the shaped blocks to the side rails if you use cauls made from cutoffs left over from making the blocks (painted darker for better visibility).

Photo J: Both of these wooden bolt hole covers look good with the bed. Choose for yourself.

CLEAT DETAILS

The screws holding the cleat to the bottom of the rail should be spaced 4" apart. The dowel pins should be spaced 5" apart.



9. Drive screws into the holes one at a time, checking to be sure the rail and cleat stay properly aligned.

Making the bolt hole covers

You can purchase bolt hole covers for this bed, or you can make your own out of wood. The wood ones are simple to make and are more traditional. You can either make 1 3/16-in. by 1 11/16-in. rectangles of ¼-in.-thick stock, or cut out ovals (see photo J).

1. To make either square or round bolt hole covers, cut them to size, sand the edges smooth, then chamfer the outside face with a plane or sandpaper.
2. Drill 9/64-in.-diameter holes in the tops and 1/16-in. or 5/64-in. pilot holes in the legs, about ⅜ in. above the top of the counterbored bolt hole.
3. Secure the covers with #6 by ¾-in. round-head brass screws.

Making the slats

All that remains is making the bed slats and finishing the bed.

1. Make the ¾-in.-thick, 4-in.-wide bed slats out of maple. To get the exact length, you should assemble the bed first and measure the distance inside the rails.
2. Notch the ends on the bandsaw with a router or upright on the table saw, as described in "A Jig for Notching Bed Slats" on p. 34. Drop each slat into place over the dowel pins, then lift the mattress into place.