Building With Log Posts

Use these methods to incorporate natural timbers into your custom work

by Kim and Linda Katwijk

As a deck builder, I find that using large timbers can transform utilitarian posts and beams into a display of craftsmanship. Structurally these decks aren't much different from a regular deck: The log posts and rough-sawn beams support the gravity loads, and I use appropriate hardware to make connections so the assembly resists wind and seismic loads.

However, there are always challenges when you're working outside the norm, and timber decks are no exception. To begin with, codes provide little design information, so it's likely you'll need to have the structure engineered. The building department may require you to have the timbers graded, which means finding a certified lumber grader. You probably won't be able to find treated logs and timbers, so you'll have to pay close attention to assembly details to protect the wood from moisture. You may be able to find locally grown rot-resistant species — such as cedar, black locust, or white oak — but otherwise it will be necessary to apply some sort of preservative.

Buying Logs and Timbers

You're not going to find big logs and heavy timbers at your local box store, and even many lumberyards have trouble getting them. Local sawmills, though, are a good source for timbers, as is Wood-Mizer (800/553-0182, woodmizer.com), a company that makes portable sawmills and maintains a list of customers who are commercial sawyers. You might also have luck with log-home companies in your area, or with pole yards, which supply telephone poles.

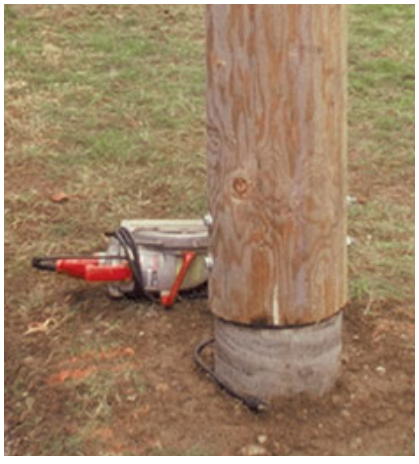


Figure 1. Because log posts are vulnerable to rot from water wicking up the end grain, the author makes the top of the footing 2 inches smaller than the post to provide a drip-edge.

There are two types of logs, milled and handcrafted. A milled log is perfectly round and the same diameter top to bottom, whereas a handcrafted log is tapered, just as the tree grew. The taper can vary dramatically from one species to another. I always order logs longer than I'll need: Typically, 1 foot to 2 feet of extra length is enough.

Raw logs fresh from the forest will need to be debarked, which you can do with a power plane, a draw knife, or an adze (Schroeder Log Home Supply, 800/359-6614, loghelp.com). Fresh logs cut in spring when the sap is running can actually be debarked using a power washer set at 3,500 psi or higher and a turbo nozzle. This method leaves the smooth cambium layer of the wood intact.

Figure 2. All layout on logs springs from a centerline. To find it, a plumb line is drawn through the center of each end of the log (above); the points where these lines intersect the face of the log are joined with a chalk line (right).

Footings

One reason I use big timbers is to span greater distances. But bigger spans call for bigger footings, which may have to be engineered.

Regardless of the size of the footing where it bears on the ground, the top of the concrete — which I call the pedestal — needs to be 1 inch to 2 inches smaller than the bottom of the log post. This provides a drip edge around the bottom of the log, helping to keep water from running underneath the bottom of the posts. To prevent water from splashing onto the base of the log or wicking up from the ground, I keep the top of the pedestal at least 6 inches above grade (**see Figure 1**).

Typical post-base hardware for 4x4 and 6x6 posts allows for some lateral adjustment. With round logs, however, which are larger than the pedestals, it's more critical to accurately place the footings so that you maintain a consistent overhang.

To form a hold-down for the post, I embed a Simpson HD-10A about 10 inches into the pedestal, leaving 8 inches of the anchor protruding. This will be fitted into a slot cut into the log with a chain saw, forming a blind connection that's more visually appealing than an exposed hold-down.

Preparing Log Posts

I determine the heights of the posts as I would for any deck. If I intend to seat the beams in pockets cut into the posts, I cut the posts to the elevation of the beam top. If the beams will sit on top of the posts, connected with hardware, the posts are cut to the elevation of the bottom of the beam, less 1/4 inch for angle-iron hold-downs.

For either design, it's important to cut the log ends square — a tricky proposition when working with natural logs. To do this, you first find the center of the log's end by measuring three ways: horizontally, vertically, and diagonally. For each

Figure 3. A framing square held to the "layout line" is used to mark the square cut at the end of the log (left). After making the cut, the carpenter checks for square (right), remembering to allow for any taper the log may have.

measurement, mark the center. You'll usually end up with a triangle of dots; the center of this triangle is what you'll use as the center point. Repeat this at the other end.

Next, with the log braced against rolling, use a level and a pencil to draw a plumb line up from the center point to the top edge of the log (**Figure 2, previous page**). Again, do this at both ends. Then, using a chalk line filled with white or blue chalk (which won't leave a permanent mark), snap a line down the length of the log connecting the top points of the two plumb lines. I call this the layout line.

Place the long side of a framing square against the layout line and draw a perpendicular line 2 inches from one end of the log (**Figure 3**). Some eyeballing will be required. Finally, use a chain saw with a sharp chain to cut the log.

My favorite saw for this kind of work is the Makita model 5012B electric chain saw, a little workhorse that generates a chain speed of 5,500 feet per minute — equivalent to a gas-powered saw, without the mess.

After making the cut, I check for square at several points. Tapered logs require some approximation. Assuming a fairly uniform taper, find the difference between the diameter at the end of the log and that at the far end of the square, 24 inches from the end of the log. Half this difference is the size of the gap you should see between the end of the square and the log as you check the cut.

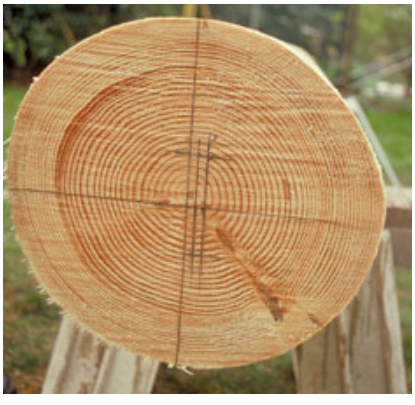


Figure 4. The hold-down anchor (above left) will fit in a slot cut in the post's bottom. Anchors are rarely centered exactly on the pedestal, so the author carefully transfers the slot layout to ensure that the post will overhang the pedestal evenly.

Cutting the slot for the HD-10A requires another layout at the bottom end. Using the chalked layout line and a level, draw a vertical line on the log's end, then measure down this line to find the center of the log. Next, measure where the HD-10A protrudes in relation to the center of the pedestal and transfer that location to the base of the log, so that the log will be centered (**Figure 4**).

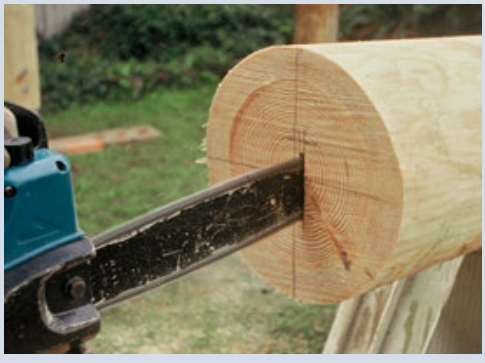
Plunge cutting with a chain saw takes a little practice and a lot of caution. If you

Safe Plunge Cuts

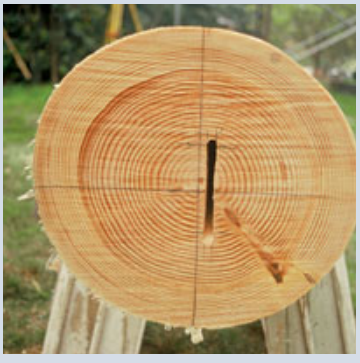
Plunge cutting with a chain saw requires caution. If the top of the bar contacts anything while the chain is spinning, it will kick back at the operator, which could result in a serious injury.

Start the cut with the bar at 45 degrees to the base of the log and the bottom of the bar tip contacting the wood.

While maintaining downward pressure to avoid kickback, slowly raise the saw as you push in.



Keep pushing down and inward, stopping the plunge when it's about 2 inches deeper than the height of the anchor.



The finished cut shouldn't be much higher than the width of the bar.

Figure 5. A propane torch heats torch-down roof membrane, used to prevent water from wicking up the log and causing rot. Once heated, the membrane is adhered to the bottom of the log post and trimmed to fit exactly.

contact the log with the top of the chain saw's bar, the saw will kick back. I typically start a plunge cut with the saw at a 45-degree angle to the bottom of the log and in line with its length (see "Safe Plunge Cuts," above). As I start the cut, I gradually raise the chain-saw bar to horizontal while applying downward pressure and pushing the bar forward into the log. If you don't apply continuous downward pressure, the bar will jerk violently upward. You need to go in only about 2 inches deeper than the height of the HD-10A.

Fitting Log to Pedestal

As protection against water wicking up from below, I seal the bottom end of the log with torch-down roofing. To do this, use a torch to heat a piece of roofing material that's slightly larger than the base of the

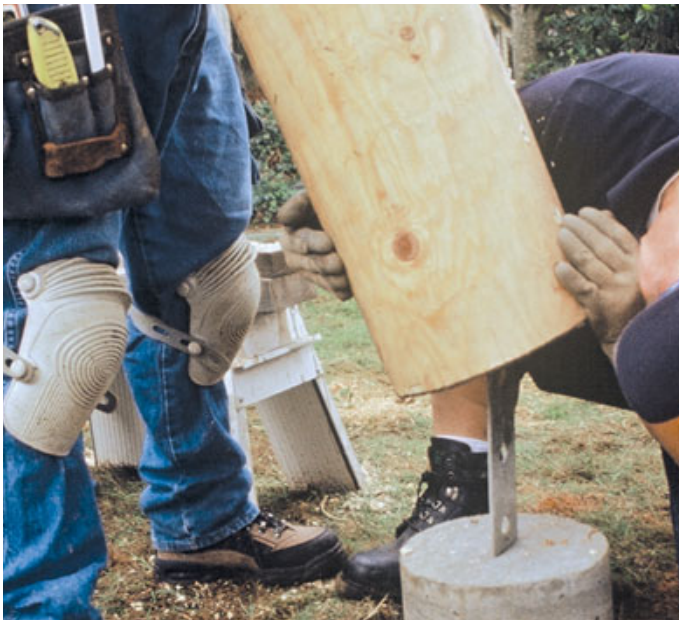


Figure 6. A torpedo level and a layout square are used to guide the drilling of holes for the anchor bolts (left). Placing the post is a two-person operation (right).

log. Then, while wearing gloves, adhere the hot membrane to the bottom of the log (**Figure 5, previous page**). When it cools, trim it with a utility knife to match the bottom of the log and slit it at the plunge cut.

The log post attaches to the HD-10A with 5/8-inch-diameter through-bolts, so the next challenge is to drill the bolt holes. First I use a level to orient the log so that the plunge cut is horizontal. Then, using the same technique as before, I draw a plumb line from the center of the plunge cut to the upward face of the log. I draw a matching line on the other end of the log and snap a new line down its length. The bolt holes fall on this line. I measure the heights of the holes in the HD-10A and transfer the measurements to the new chalk line.

The next step takes two people. One carpenter drills the hole while the other guides the 11/16-inch auger bit with a layout square and a torpedo level (**Figure 6**). After the holes are drilled, we slip the log over the HD-10A to make sure they align. The bolts should be about 1 inch longer than the diameter of the log so there's room for the nut and washer. We plumb the post and brace it from two directions.

Joining Post to Beam

As mentioned above, beams either sit on top of the posts or in pockets. Pockets can be cut so the beam runs through, or the beam end can be hidden in a blind pocket.

Pocket cuts require two parallel cuts for the sides and a plunge cut at the bottom. To be safe, we work from scaffolding, first running a string line from post to post down the length of the deck to represent one side of the beam. We mark that side on the tops of the posts, then measure to mark the other side. From these lines, we draw plumb lines down the sides of the posts, mark the bottom, and use the chain saw to cut the pocket (**Figure 7**).

Blind pockets are laid out and cut in much the same way, but the side cuts and the bottom plunge cut don't go all the way through. Also, you'll need to make a blind cut from above to end the pocket.

After test fitting the beam in the pocket,

Figure 7. With the posts up and braced plumb, a string is used to establish the line of the beam. A carpenter uses a level to lay out the side cuts for the beam pocket (left), then makes the cutout with a chain saw (above), working off staging for stability.

it's a good idea to bevel the remaining flat parts of the log's top to shed water (**Figure 8**). I fasten the beam to the pocket using FastenMaster's LedgerLok screws. You could also use bolts or lags.

If the beams sit on top of the posts, I attach them with 4-inch-long pieces of 4-inch-by-1/4-inch powder-coated angle iron with two holes on each leg for lag screws. The angle brackets attach to the bottom side of the beam and to the side of the post to transfer lateral loads. (All these connections are engineered.)

Figure 8. After the pockets for the beams are cut, the tops of the posts are beveled so that they shed water.

Preventing Rot

Because large timbers and logs are usually not pressure-treated, I use a three-prong approach to prevent rot: preservative, sealing, and covering.

I prefer to use borate wood preservatives, which are nontoxic and easy to apply. Two brands that I've used are Timbor (Borax, 760/876-4775, borax.com) and Bora-Care (Nisus Corp., 800/264-0870, nisuscorp.com). Timbor comes in a powder and must be mixed with hot water. Bora-Care comes in liquid form. You apply them with either a sprayer or a brush.

For severe exposures, like the windy side of a house in a moist climate, I also use Impel Rods (Wood Care Systems, 800/827-3480, ewoodcare.com). I insert them into holes — drilled in the log at vulnerable areas, such as the top and bottom where end grain can wick in moisture — and plug the holes. These crystalline borate rods, which come in 1/8-inch to 1/2-inch diameters, sit inside the wood until moisture dissolves them. The dissolved borates then move within the wood toward the highest concentration of moisture, inhibiting the growth of fungus and rot.

Because borate products are water soluble, they need to be sealed into the wood. I use One Time (Bond Distributing, 866/663-8463, onetimewood.com), which is an acrylate resin that soaks deep into the wood and cures with sunlight. Over the past 12 years, I've tested numerous stains and preservatives, and One Time is the best I've found. While its initial cost of about $75 a gallon may seem high, the manufacturer guarantees that it will last seven years. This beats the annual or biannual reapplication required with most other sealers.

Finally, you need to provide a barrier to shed the water from the tops of the timbers and posts. I find that torch-down roofing gives the best results. Again, I use the torch to melt the roofing to the top of the wood, both the beams and the posts (**Figure 9**). Torch-down roofing membrane comes in 18-inch-wide and 36-inch-wide rolls. Using a utility knife, I cut the membrane into long strips 2 inches wider than the beam. After adhering it to the top of the beam, I trim the membrane so that 1/2 inch overhangs each edge of the beam; this provides a drip edge to direct the water away.

This three-pronged approach to preventing rot has satisfied every building department I've dealt with, although some have required an engineer's report. The engineer I use has gladly provided the documentation.

Figure 9. The author treats the wood with a borate preservative before placing the beams in their pockets. Note the torch-down roofing membrane applied to the beam and post tops in the background.

Kim Katwijk *is a deck builder in Olympia, Wash.* ***Linda Katwijk*** *co-authored this article, which was reprinted with permission from* Professional Deck Builder *magazine.*