Framing a Deck With Big Timbers

Sharpen up your chainsaw skills and call in the engineer

by Kim and Linda Katwijk

There's something awe inspiring about heavy timbers and huge logs, and when they're used in decks, they transform utilitarian posts and beams into a display of craftsmanship. Structurally, though the posts are logs and the beams are sawn timbers, these decks aren't much different from a regular deck. Posts and beams still support the loads, and hardware still connects the assembly to resist wind, seismic, and other loads.

However, challenges always exist when you're working outside the norm, and timber decks are no exception. To begin with, codes provide little design information; therefore, 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.

Framing a Deck With Big Timbers

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, www.woodmizer.com), a company that makes portable sawmills and maintains a list of customers who are commercial sawyers.

For logs, try the nearest log-home company. Other sources are pole yards (which supply telephone poles) and local tree services or loggers. 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. Order logs longer than you need: Typically, 1 foot to 2 feet of extra length will be enough.

Logs can be finished products or raw material fresh from the forest. The latter will need to be debarked, which can be done with a draw knife or an adze (Schroeder Log Home Supply; 800/359-6614, www.loghelp.com). Logs fresh cut in the springtime when the sap is running can be debarked using a power washer at 3,500 psi or greater with a turbo nozzle. This method leaves the smooth cambium layer of the wood intact. You can also use an electric plane.

Footings

One reason for using big timbers is to span greater distances. Bigger spans call for bigger footings, though, which you may need to have engineered.

Regardless of the size of the footing where it bears on the ground, the top of the concrete — which I call a 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 splashing onto the base of the log or wicking up from the ground, the top of the pedestal should be at least 6 inches above grade (**Figure 1**).

Figure 1. Log posts are vulnerable to rot from water wicking up the end grain. Sizing the portion of the footing that's above grade to be 2 inches smaller than the post provides a drip-edge. Keep the post at least 6 inches above grade to minimize the effect of rain splashing upward.

With typical, smaller posts such as 4x4s or 6x6s, the post-base hardware allows for some adjustment. In the case of logs, where the log is larger than the pedestal and you want to maintain an even overhang, it's more important than usual to have accurately placed the footings.

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 (**Figure 4, page 4**). This will be fitted into a slot chainsawn into the log, forming a blind connection that's more appealing to the eye than a hold-down mounted on the outside.

Preparing Log Posts

Determine the heights of the posts as you would for any deck. If you intend to seat the beam in pockets cut into

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 (far left); the points where these lines intersect the face of the log are joined with a chalk line (left).

the posts (more on this on page 6), then cut the posts to the elevation of the beam top. If the beams will sit on top of the posts and be connected with hardware, the posts should be cut to the elevation of the bottom of the beam, less 1/4 inch for the angle-iron hold-downs.

For either design, you need to cut the log ends square. To do this, first find the center of the log's end by measuring three ways: horizontally, vertically, and diagonally. For each measurement, mark the center. You'll usually end up with a triangle of dots; the center of this triangle is the point I use as the center point. Repeat at the log's other end.

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**). Again, do this at both ends. Fill a chalk line with white or blue chalk (white and blue don't leave a permanent mark) and snap a line down the length of the log connecting the top points of the two plumb lines. This is the layout line.

Place the long side of a framing square against the layout line and draw a line square to the layout line 2 inches from one end of the log (**Figure 3**). Some eyeballing will be required. Use a chainsaw with a sharp

Figure 3. To mark the end of the log to be cut square to the centerline, a framing square is held to the layout line (left). It takes a little finesse to hold the pencil square to the square. After the cut, check for square (below), but remember to allow for any taper the log may have.

Figure 4. The hold-down anchor (above left) will fit in a slot cut in the post's bottom. The odds are that the anchor is not centered exactly on the pedestal. Measure carefully to ensure that the anchor slot is cut so that the post eventually will overhang the pedestal evenly.

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

With the framing square, check from several points that you have cut the end square. Tapered logs will 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. Half of this difference is the length of the gap you should have between the end of the square and the log. Once the bottom is squared, measure and cut the top to length.

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

Plunge cuts with a chainsaw take a little practice and a lot of caution. If you contact the log with the top of the chainsaw's bar, the saw will kick back at you. 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," page 74). As I start to cut into the bottom of the log, I gradually raise the chainsaw bar to horizontal while applying downward pressure and pushing the bar forward into the log. If continuous downward pressure is not applied, the bar will jerk violently upward. You need to go in only about 2 inches deeper than the distance that the HD-10A protrudes from the pedestal.

Safe Plunge Cuts

Plunge cutting with a chainsaw must be done properly to be safe. If the top of the bar alone contacts anything while the chain is running, it will kick back at the operator, possibly resulting in injury. The author is an experienced hand with a chainsaw, and these photos show how he avoids this dangerous occurrence.

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 length of the anchor strap.

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

Fitting Log to Pedestal

As protection against water wicking up from below, I seal the bottom end of the log with torch-down roofing. With a torch, heat a piece of roofing material that's slightly larger than the base of the log and — while wearing gloves — adhere the hot roofing membrane to the bottom of the log (**Figure 5**). 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 will be attached to the HD-10A with through-bolts, and your next challenge is to drill the holes for them. Use a level to orient the log so that the plunge cut is horizontal.

Using the same technique as before, draw a plumb line from the center of the plunge cut to the upward face of the log as it lies on the sawhorses.

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

Draw a matching line on the other end of the log and snap a new line down its length. The bolt holes will be on this line. Measure the height of each hole in the HD-10A from the top of the pedestal and transfer these measurements to the new chalkline.

The next step is a two-person operation. One person drills the hole, and the other guides the 11/16-inch augur bit with a layout square and a torpedo level (**Figure 6**). With the holes drilled, slip the log over the HD-10A and see if they match up (**Figure 7**). Slide the 5/8-inch bolts through the holes. The bolts should be about 1 inch longer than the diameter of the log so there's room for the nut and washer. Plumb the post and brace it from two directions.

Joining Post to Beam

Once all the posts are installed, you can lay out their tops for the beams. There are several ways the beams can meet the posts: The beam can sit on top, it can sit in a pocket cut for the beam to run through, or it can sit in a blind pocket, where the beam end is hidden in the post.

Pocket cuts require two parallel cuts for the sides and a plunge cut at the bottom. Working from scaffolding for safety, run a string line from post to post down the length of the deck to represent one side of the beam. Mark that side on the tops of the posts, then measure over and mark the other side. From these lines, draw plumb lines down the sides of the posts; then mark the bottom at the proper elevation and chainsaw out the pocket (**Figure 8, page 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 (**Figure 9, page 7**). Also, you'll need to make a blind cut from above to end the pocket.

After test fitting the beam in the

Figure 6. A torpedo level and a layout square are used to guide the drilling of holes for the bolts that will secure the log to the anchor.

Figure 7. Placing the post is a two-person operation. Be sure the log is oriented correctly, and not 180 degrees off.

Figure 8. 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.

pocket, it's a good idea to bevel the remaining flat parts of the log's top to shed water (**Figure 10**). I fasten the beam to the pocket using FastenMaster's LedgerLok screws. You could also use bolts or lags.

If the beams are to sit on top of the posts, I attach them using 4-inch-long pieces of 4-inch-by-1/4-inch powder-coated angle iron with two holes on each leg for lags. 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 need to be engineered.

Preventing Rot

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

I prefer to use borate wood preservatives. Essentially nontoxic to humans, they're safe and simple to apply. Two that I've used are Timbor (Borax; 760/876-4775, www.borax.com) and Bora-Care (Nisus Corporation; 800/264-0870, www.nisuscorp.com).

Timbor comes in a powder and must

Figure 9. The pockets for beams also require plunge cutting with a chainsaw. The same safety rules apply, with the additional caveat that you should work from scaffolding for stability.

Figure 10. To shed water, the tops of the posts are beveled after the pockets for the beams are cut.

Figure 11. Before the beams are placed in their pockets, the wood is treated with a borate preservative. Note the torch-down roofing membrane applied to the beam and post tops in the background.

be mixed with hot water. Bora-Care comes in a liquid form. To apply either, use a sprayer or brush.

In severe conditions, such as the windy side of a house in a moist climate, I also use Impel Rods (Wood Care Systems; 800/827-3480, www.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.

The crystalline-borate rods, which come in 1/8-inch to 1/2-inch diameters, sit inside the wood until moisture dissolves them — then the dissolved borates move within the wood toward the highest concentration of moisture, inhibiting the growth of fungus or rot.

Because borate products are water-soluble, they need to be sealed into the wood. I use One Time (Bond Distributing; 866/663-8463, www.onetimewood.com), which is an acrylate resin that soaks deep into the wood and cures with sunlight. Over the past 12 years I have 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 it to 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.

The application requires a handheld torch to melt the torch-down roofing to the top of the wood, both beams and posts (**Figure 11**). 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 to provide 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 gladly provided the documentation. ❖

Kim Katwijk is a deck builder in Olympia, Wash., and a contributing editor to Professional Deck Builder. *Linda Katwijk co-authored this article.*