Building a Round Room

by Bob Blodgett

Creative use of plywood for plates and headers simplified the framing of these two round towers

Our company recently finished a large custom Victorian. The crowning touch of the project was a pair of round, two-story towers. It was probably the most difficult project I've ever worked on, but in the end it came out well and the owners are very happy with their new home. In this article I'll describe some of the trickier aspects of laying out and framing a round structure with a conical roof.

Foundation First

The first order of business was to locate the center point of the 12-foot-diameter circle for each tower. We used this center point throughout the project, dropping a plumb bob to transfer it upward through successive stories.

The foundation contractor used 2-foot straight form sections, keeping them just inside the 6-foot radius. Because porches surround the tower, you can't see that the foundation is segmented rather than perfectly round.

Sill plates. At this point, the router became the most useful tool on the whole job. We mounted our trusty 1 1/2-horse Porter-Cable at one end of a long strip of plywood and put a 1/4-inch-diameter steel pivot pin at the other end (see Figure 1). We used this pivoting jig to cut the sill plates and all the top and bottom plates for the walls. We moved the pivot pin as necessary to rout the outside and inside edges of the plates.

We used a double layer of 3/4-inch pressure-treated plywood for the sill plates, and regular structural sheathing-grade plywood for the wall plates.

Deck Framing

With the sill plates bolted in place, we installed the floor joists, letting them run a little long over the sill plates — they were cut off later. We then laid the plywood subfloor, letting it hang over a little as well. With the router jig, we trimmed the subfloor, using the same pin location as for the outside of the sill plate and working from the exact center of the room. We set the router cutter a little deeper than the subfloor thickness to mark where joists would need to be trimmed.

We decided not to make a curved box sill but instead installed short 2x6 cripple studs under the plywood, putting them 12 inches on-center, to carry the load from the walls above and provide nailing for sheathing.

Wall Framing

The walls were also framed with 2x6s, again 12 inches on-center to provide a smooth continuous curve for the exterior finishes (for more on curved wall framing, see "When Walls Go Round," 7/91). We used doubled 3/4-inch plywood for the bottom plates and four layers for the top plates (Figure 2). This created a slight problem: When we got to the top of the wall, we found the round walls were slightly lower than the rest of the walls in the house and had to be packed out with 1/4-inch plywood. This was because 3/4-inch plywood is actually only 23/32 inch thick, so by the time we had stacked six layers for the top and bottom plates, we ended up losing 3/16 inch.

Headers. The next step was building curved headers. We ripped 9 1/4-inch-wide strips of 1/2-inch plywood, then kerfed them every 1 1/2 inches, 3/16 inch deep, so they would bend easily around a radiused clamping jig (Figure 3). Using construction adhesive, clamps, and screws, we made two triple-layer sandwiches for each header, then connected them top and bottom with the same 3/4-inch plywood that we had used for the

Figure 1. *Router jig.* *A router on a pivot jig proved a necessity for making plates (top) and trimming subflooring (above).*

Figure 2. *Plywood plates.* *A double layer of $^{3}/_{4}$-inch plywood formed the bottom plates of the round walls; the top plates took four layers.*

Figure 3. *Curved headers.* *Carpenters made laminated window headers by bending three layers of $^{1}/_{2}$-inch plywood around a form, and gluing it and screwing it together (left). Each header has two triple-laminated pieces, joined at top and bottom by $^{3}/_{4}$-inch-plywood plate material (right).*

wall plates. (We also used this plate material for the rough window sills.)

Sheathing. Sheathing the round walls was difficult. We used two layers of 1/4-inch plywood, running them horizontally around the wall and staggering the joints. This took three men, two to bend the plywood around the wall and one to screw it off. We even broke a few sheets in half trying to make the bend. (We first experimented with installing the sheathing vertically. It was easier to bend in this position, but it seemed too flimsy between the studs.)

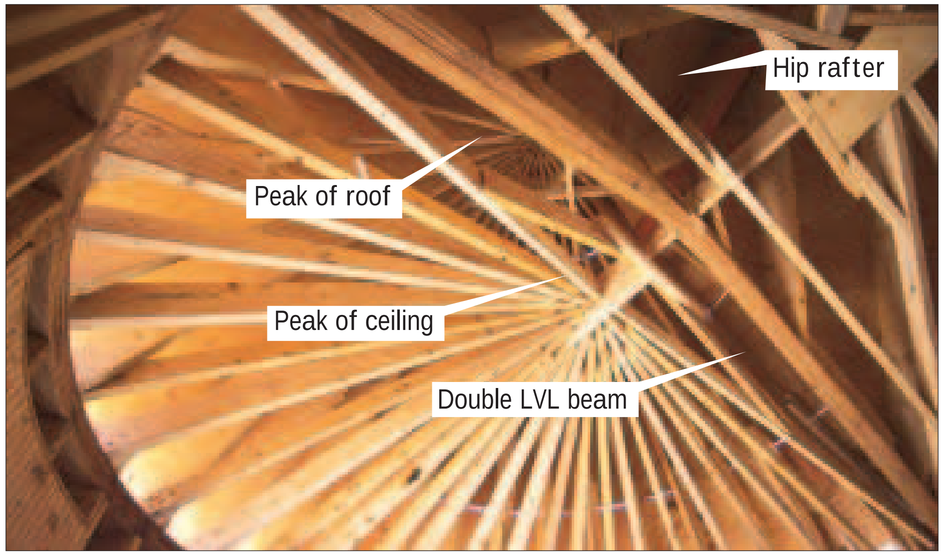

Figure 4. *Roof framing.* *The conical roof framing was complicated by a hip rafter from the main roof that landed in the middle. To catch the end of the hip, the author used a double LVL beam, assembled like a rafter pair to match the profile of the vaulted ceiling.*

The Roof

The roof of the entire house was quite complicated to build, with loads of hips and valleys. The conical roofs, with their 23/12 pitch and 6/12 flare at the bottom, were no exception.

The basic round roof was figured the same as any other roof having a 6-foot run and a 23/12 pitch (for more on round roof framing, see "Framing Tower Roofs," 5/91). The complicating factor was that the end of a hip rafter from the main roof landed right in the middle of the conical roof, about 3 feet up from the bottom of the rafters. We supported this hip with a double 12-inch LVL, but since the ceiling below was vaulted, the LVLs were more like rafters than a carrying beam (Figure 4).

Roof sheathing. Sheathing the roof was fairly tricky. Again, we used a double layer of 1/4-inch plywood. Each piece first had to be cut with a radius at the top and bottom. To mark the radius cuts, I first snapped a line on the deck to represent a rafter. I laid the first sheet of plywood perpendicular to this chalk line, with the line running right across the middle of the sheet (Figure 5). I then measured along the line from the bottom edge of the plywood to a point equal to the length of the rafter and drove in an 8-penny nail for a pivot point. With my tape measure and a pencil, I swung an arc along the bottom of the plywood. I then shortened the tape and swung a second arc at the top of the plywood, trying to get as much out of the sheet as possible.

Next, I lapped a second sheet over the first sheet, positioning it along the centerline so that its bottom arc would match the top arc of the previous sheet. Again, I swung arcs with my tape measure and pencil. I repeated this process, with increasingly shorter radiuses, until I reached the pivot point (the peak of the roof). We cut the plywood with a jigsaw.

As with the wall sheathing, it took three men to install the plywood on the roof. We nailed from the center out toward the edges of the sheets, with two men holding and one nailing. We cut the ends square to the rafters right in place.

Soffit, fascia, and exterior trim. After the rafter tails were cut, we routed 3/8-inch A-C plywood to the correct radius for the soffit. This created a smooth curve to bend the fascia around. For fascia and frieze boards (Figure 6), we used 3/4-inch pine, which we kerfed 3/8 inch deep on the back every 1 1/2 inches to make the

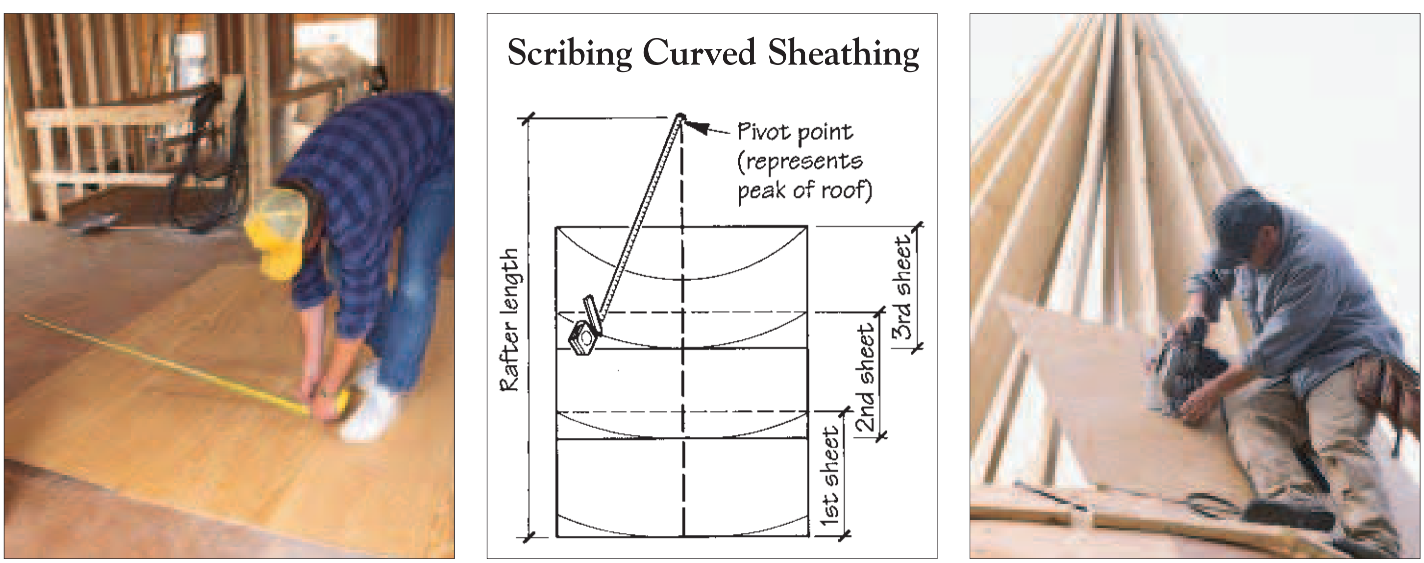

Figure 5. *Roof sheathing layout.* *The author laid out and cut roof sheathing three pieces at a time by swinging radiuses from a pivot point that represented the top of the rafter (left and center). The plywood was nailed off, then cut square to the rafters in place (right).*

Figure 6. ***Exterior trim.*** *Fascia, frieze, and exterior trim was kerfed on the back to make the bend.*

Figure 7. ***Interior trim.*** *By swinging a sheet-metal screed from a pivot jig attached to the center point of the ceiling, the plasterer created a perfectly round crown molding (left). Wood baseboards and window casings (right) had to be steamed and clamped into place to make the bend.*

bend (and even then we fought with it). We used cedar shingles as a drip-edge. We installed these before the shingle mold, so we could push the shingle molding up to the cedar for a tight fit.

For the shingle mold and crown, we used flexible moldings from Flex-Trim Industries. These gave us a few problems. First, the stainless-steel ring-shanked nails we used caused dimples. We first tried nailing at about 12 inches on-center. But as soon as the sun hit the flexible trim, it sagged between nails. So we went back and nailed on 6-inch centers. The next day, the molding had sagged again, and we ended up nailing it about every inch to stop the sagging. We called Flex-Trim about the problem, and they pointed out that construction adhesive would help, but at that point it was too late.

Flashing and roofing. We laid a self-sticking eaves flashing membrane over the cedar drip-edge and in all the valleys, since they were curved and since metal wouldn't have worked. The asphalt shingles on the conical roofs had to be cut with a radius, just like the plywood sheathing. (The roofer experimented with using straight sections, but it looked too chopped up.) Consequently, he ended up cutting all of them by hand. This reduced the courses to about $4^1/4$ inches, and took twice as long as anticipated. He wove the shingles at the curved valleys.

Custom Windows

We were pleasantly surprised to find that Marvin carries a line of radiused windows. The 6-foot radius we needed was a standard size, so we didn't have to pay extra for special setup at the factory. The windows came with full jambs, curved sills, and exterior casing, ready to install. They install just like any other window.

Drywall, Plaster and Interior Trim

Because of the tight radius, the drywallers felt that $^3/8$-inch drywall would work best. They poured water over the backs of the sheets and let them soak for an hour before bending them into place. The vaulted ceilings required installing the drywall in pie-shaped pieces, then building up the joints with Durabond for the smooth troweled finish. Overall, the drywall in the round rooms took about twice as much time as estimated.

Plaster moldings. After the drywall was done, the plasterers began the crown moldings, using a screed made out of sheet metal to shape the profile. For the straight sections of wall, we installed a perfectly straight wooden strip — a "ground" — for them to work to. For the round walls, they built a pivoting jig, much like the router jig we used for the plates, and installed it at the center point of the ceiling. With the screed attached at the end of the pivot arm, they were able to pull a perfectly radiused molding (Figure 7).

Again, the time the crown took was underestimated, so we were able to use plaster in only one of the two rooms that have crown. In the other room, we used a Flex-Trim product, which worked much better on the inside than on the exterior.

Steam-bent trim. We started the interior trim by making the sills, again using the router jig. That was the easy part! The baseboards and window head casings, because they were concave, had to be steam-bent, a time-consuming process (for more on steam-bending wood trim, see "Trimming a Curved Balcony," 2/94).

Even though we steamed the trim, we still had to use clamps to help pull it tight to the wall. And the moisture from the steam made the trim swell, so when it dried, the mitered joints opened up. This in turn made more work for the painter.

If there's a lesson in all of this, it's to overestimate the time it takes to build in the round. Figure out the time you think it will take to do the trickier tasks, then *double* it. Even then, you may come up short. ■

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Photos by Carolyn Bates.