Building Log Homes

by Bill Averette

Using a kit with kiln-dried logs reduces shrinkage and results in a tighter shell

For many years I owned a remodeling business and a wholesale building-products company. Although I made a decent living, I really didn't enjoy the work. So in 2005, with help from a friend who'd built his own log home, I started a log-home–building company, Mountain Dream Homes. One of the best parts of my new business is the clients: Most have always wanted a log home in the mountains, so they're easy to work with. That makes building fun again.

But even with all the interesting projects and good clients, log building presents certain unique difficulties. For instance, the logs arrive at the site precut, so the foundation must be perfectly sized and square within 1/8 inch.

Also, we have to educate clients about the various differences between conventional and log homes and between kiln-dried and green logs. Kiln-dried logs cost more, of course, but they also minimize a home's maintenance needs and maximize its livability. Green logs, on the other

Figure 1. The author rents an all-terrain forklift on delivery days. The pallets are covered with plastic and arranged so the lower log courses are on top of the stack.

Figure 2. In addition to standard carpentry tools, building with logs requires a large circular saw for trimming ends and adding or expanding window and door openings. A 1/2-inch electric impact wrench drives the lag screws that connect the log courses.

hand, shrink quite a bit as they dry, causing cracks and checks in the wood and openings between logs that have to be sealed regularly. For the first year or two after the house is built, springs and screw jacks need to be adjusted every couple of months by either the builder or the homeowner as the logs shrink. During the building process, we have to allow for the shrinkage by leaving a 3-inch gap above all doors and windows, so the house can settle without damaging them. This can make installing trim and air-sealing more difficult. And plumbing and hvac systems require special slip joints and careful planning.

With kiln-dried logs, none of these steps are necessary. Our supplier guarantees no more than 3/8 inch of movement throughout the life of the home.

The Logs

The eastern white pine logs we use come from the northern Pennsylvania and western New York area. Our favorite supplier is Kuhns Bros. (800/326-9614, kuhnsbros.com), a company that uses a unique kiln-drying process that heats the logs to 170°F for four to seven weeks. Besides drying the logs to a uniform 19 percent moisture content, this step sanitizes them and kills any insects living inside. (The only other insect control needed is a termite ground treatment, which is standard procedure in our area anyway.)

The logs are debarked and machined to uniform size in one of 15 profiles. Some profiles have rounded sides, like the Swedish cope profile on the home pictured here. Others have flat sides with or without a decorative notch or V-groove.

Once we place an order, delivery of a log-home package typically takes three to four weeks. We can arrange for it to arrive in as many as five different deliveries. If, for example, there's not enough room at the site to stack all the logs and material,

Figure 3. Set into urethane sealant, the first log course is carefully aligned to the layout lines with a framing or layout square. The ends of logs have dadoes that receive plywood splines for structural reinforcement and weatherproofing. While this wall starts with a full log, adjoining walls start with a half log so they can overlap at corners.

Figure 4. Dried to about 19 percent moisture content, kiln-dried logs are noticeably lighter than green logs. Most can be carried and lifted into place without struggle by a pair of workers. Logs are identified on their ends, and a framing plan provided by the manufacturer shows their location in the structure. T-shaped braces hold the walls plumb while they're assembled.

we'll store it at our local lumberyard and get the material delivered in smaller quantities. The local yard charges a small storage and delivery fee for this service.

The logs arrive on pallets, wrapped in plastic for weather protection, and we cover them with tarps as added insurance. The pallets are arranged so the logs we need first are at the top of the stack. On delivery days, we rent an all-terrain forklift to get the logs from the trailer to the building site (**see Figure 1, page 2**). We make every effort to stage the deliveries so we receive only the material we need at that particular time.

Design

Most of the homes we build are custom, but Kuhns Bros. has a catalog of standard designs that can be modified to the homeowner's individual specification. For custom homes, we work with a designer who specializes in log construction. Some homeowners bring us their own plans. Either way, Kuhns Bros. uses the provided drawings to engineer the home and precut the logs. With our supplier's help, we can build almost any log structure, regardless of size and complexity.

Tools

Besides standard carpentry tools, we have two specialty power tools we use regularly: a 16-inch Makita beam saw, which we call "Big John," and an electric impact wrench to drive the 3/8-inch lag screws that connect the log courses (**Figure 2, page 2**). We also have a 16-inch Husqvarna chain saw

Figure 5. Where stick-framed interior walls meet the log walls, saw kerfs make it easy to install drywall or paneling that doesn't require fussy finishing or scribing. The kerfs are made on site with a circular saw and a chisel.

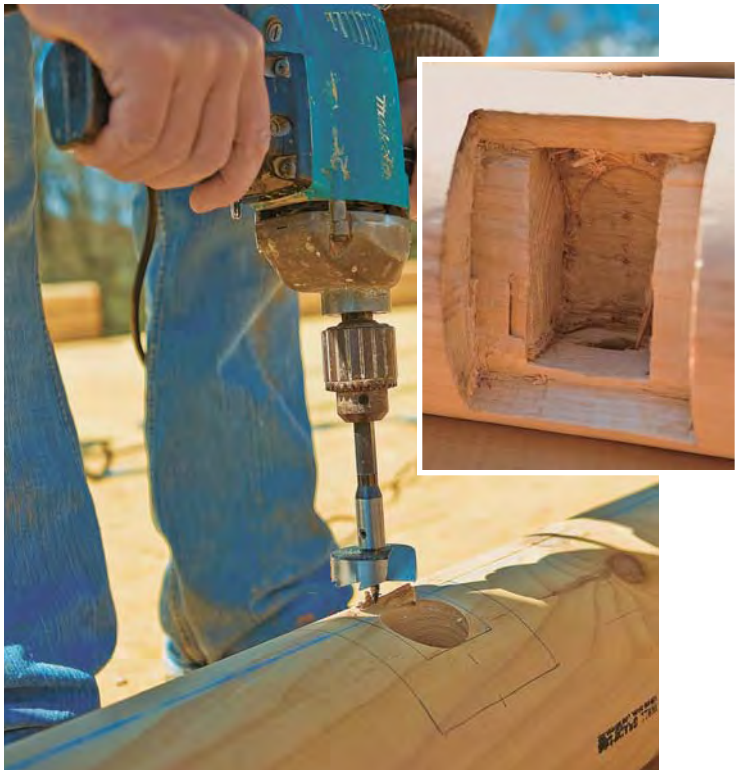

Figure 6. Using a cardboard template, a worker draws the outline of a work box (left), then uses a 1/2-inch drill with a Forstner bit to hog out the material (above). A small router finishes off the recess.

that we use on occasion. We rent telehandlers and cranes for setting ridge beams and other heavy work.

Stacking Logs

Our log homes start with a pretty conventional foundation and floor system — except that the band joist is 4x10 hemlock instead of 2x10s or engineered rim board. We attach it to the 2x10 floor joists with metal banding. Next we install a layer of 3/4-inch AdvanTech, then two beads of Sikaflex polyurethane caulk to seal the joint between the first log course and the subfloor (**Figure 3, page 3**).

The first course is lagged into the band joist with 3/8-by-12-inch galvanized lag screws every 30 inches. We place a self-adhesive gasket on top to seal the gaps between logs. Following courses are screwed together using the same fastening schedule. The logs come from the factory predrilled, but sometimes we need additional holes, in which case we use a 3/8-inch drill bit with a counterbore at the top. Where logs are butted end to end, a 1/2-inch plywood spline strengthens and weatherproofs the joint.

The manufacturer's standard wall height is 8 feet, but most homes we build have 9- or 10-foot ceilings in keeping with the lodge aesthetic so many homeowners want. We use temporary bracing at corners and near doors and windows to hold everything plumb while we work our way up the wall (**Figure 4, page 3**). Where framed interior walls meet the log exterior walls, we make a kerf in the logs to receive either T&G paneling or drywall (**Figure 5, page 3**).

Mechanicals

One of the greatest challenges with log building is hiding the plumbing, hvac, and electrical systems. Our strategies vary according to where the systems are located. Concealing them on the house's first level is easiest: We almost always have either a sawn-lumber or an I-joist

Figure 7. A carpenter taps in plywood splines (above left) that mate with dadoes in the backs of door and window bucks (above). The window fins are fastened to the bucks, then covered with trim (left).

floor system where we can run pipes, ducts, and wires.

On the second floor, pipes and ducts are harder to hide. Generally we build a conventional floor system above the log-shaped ceiling joists and tongue-and-groove ceiling planks. This has the added advantage of making the house a lot quieter. Although the log joists and 2-by ceiling boards can be load-bearing, sound passes easily through the single layer of solid material, making the home very noisy floor-to-floor. Plus, even if we tried to save the client money by eliminating the second-floor system, we'd still have the expense of trying to hide the mechanicals, which is labor-intensive and creates design and aesthetic problems.

Figure 8. Doors and windows are cased with pine trim to match the logs. The preassembled picture-frame casing is scribed and let in over the window's nailing fin. A layer of peel-and-stick flashing over the fin seals the joint.

Most interior walls are stick-framed and covered with either drywall or tongue-and-groove paneling, so we use the stud bays for running the mechanicals between floors. We avoid putting pipes or ducts on exterior walls, but we do have to install electrical devices in them (**Figure 6, page 4**). Routing the wires from the floor cavities below limits the number of logs we have to drill through to reach the boxes.

Windows and Doors

Kuhns Bros. cuts the logs to length, which creates the rough openings for doors and windows. The log ends have a 1/2-inch groove cut from top to bottom. We insert plywood splines into the routed grooves (**Figure 7, page 5**) and seal them with a heavy application of Sikaflex urethane sealant. We then install a wood buck over the splines and seal the joint between the wood buck and the logs with another bead of Sikaflex. The window is nailed to the wood bucks and trim installed over the nailing fin (**Figure 8**). We use a foam gasket between the logs and the window buck at the top and bottom. The log that forms the bottom of the opening is beveled so it sheds any water to the outside.

Finish

We use Sikkens (866/745-5367, www.nam.sikkens.com) and Sashco (800/767-5656, sashco.com) products for finishing the exterior because we've had good results with their adhesion and durability. Lighter stains, we've found, last three to five years and darker stains five to seven. We add a product called Bug Juice (Walla Walla Environmental, 800/247-9011, wwenvironmental.com) to the stain to prevent damage from wood-boring bees. Roof overhangs and window casings are generally stained to match the rest of the house.

To seal and protect the log interior, we use Sansin's Purity Clear (877/726-7461, sansin.com), which prevents the wood from darkening or yellowing too quickly.

Bill Averette *co-owns Mountain Dream Homes in Blue Ridge, Ga.*