Laying a Stone Floor

Carpenters laid out and cut the stone for this patterned floor

by Patricia McDaniel

Like any custom building and remodeling company, our firm often encounters tasks that aren't strictly carpentry but require a lot of the same skills. On a recent project, the owner wanted a natural stone floor. After visiting several stone yards, he selected Arizona sandstone, which was available as irregular slabs, roughly 3x4 feet on the face and 3/4 to 1 1/2 inches thick (see Figure 1).

The project architect created the layout, a 6x6-foot repeating square containing 11 rectangular pieces (Figure 2, next page). Because so much cutting was involved — and because the soft sandstone cuts fairly easily — we decided to use our own crew to cut and dry-fit the pieces, then bring the mason in to set and grout the stone.

Figure 1. The Arizona sandstone the author used came in large, irregular slabs of varying thickness.

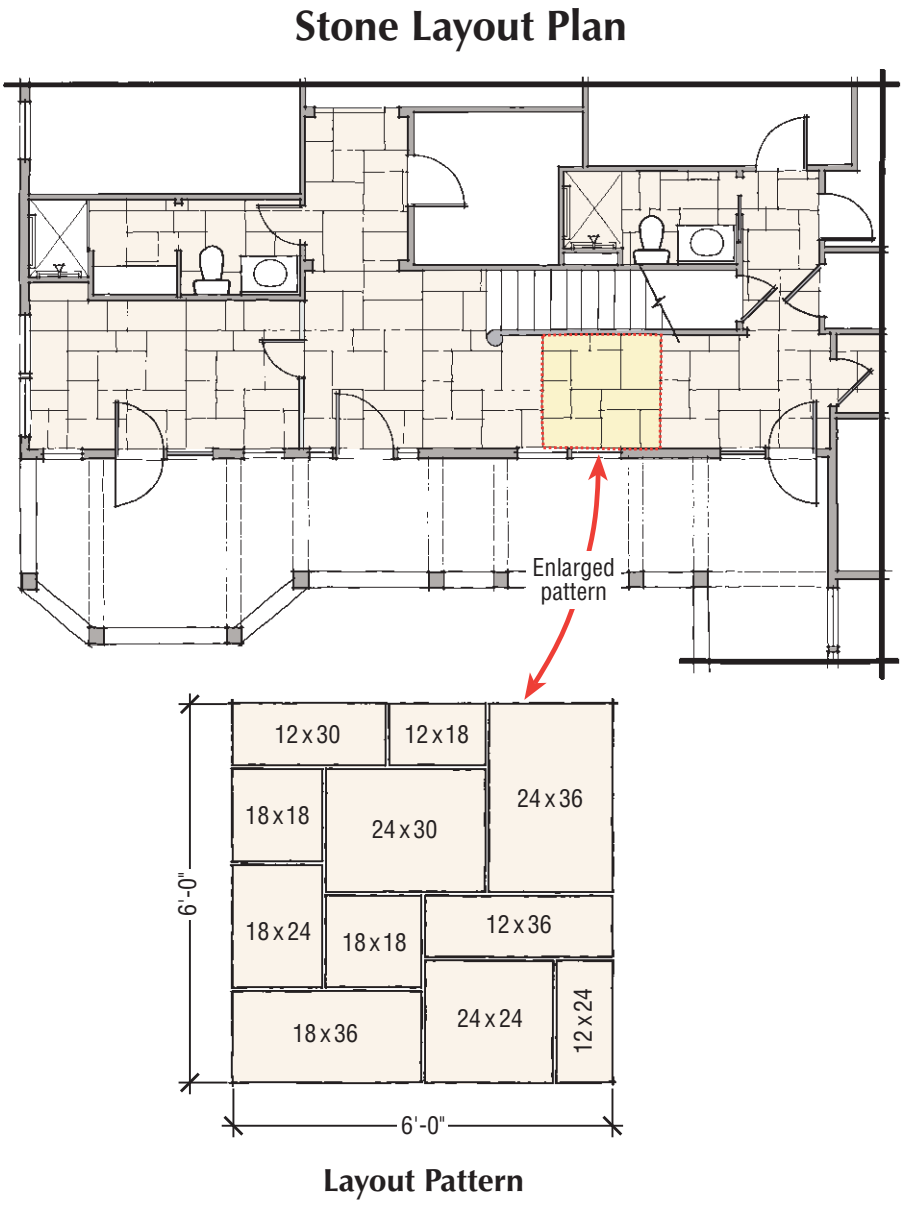

Figure 2. A repeating grid of 11 rectangles made a pleasing floor layout.

Jigsaw Puzzle

Arizona sandstone is sold by the ton, in pallets of about 1 1/2 tons. The stone yard told us to expect 110 square feet of coverage per ton. Since we were cutting the irregular slabs into rectangles, we thought we'd need to add in about 20% for waste, for a total of about 5 tons of stone for a 460-square-foot area. In fact, waste was quite a bit higher than expected, and we ended up needing 8 tons. Fortunately, we'll be able to use much of the sizable scrap pile elsewhere on the project.

With the help of CAD, we superimposed the stone layout on the floor plan. There were ten different sizes of stone, ranging from 24x36 inches to 12x18 inches. Using colored pencils, we marked and counted the number of each size, then made full-size templates for each from scrap OSB (Figure 3).

Next, we sorted the stone, marking the best faces and using the templates to help us decide which size pieces to cut from each slab. (This was where we realized that our initial estimate was low, allowing us to order the additional stone early in the process.)

Simple Tools

We set up shop outdoors — a few rugged sawhorses and plywood table tops. The cutting tool of choice was a Makita circular saw fitted with a diamond blade purchased from a masonry supply house.

To cut the stone, we sawed about three-fourths of the way through from the back, taking several shallow passes (Figure 4). Then, arranging the cut line along the edge of the work table, we used a 2-foot-long by 3/4-inch-thick piece of steel as a hammer to snap off the stone at the kerf.

This created a slightly uneven, very sharp edge, but a scrap of the sandstone itself made a fine rubbing block

for softening it (Figure 5, next page). As we finished cutting the stone, we stacked the pieces on edge in the garage, sorted by size.

Prepping for Installation

The next step was to prep the concrete subfloor. When we poured the slab, we recessed the stone floor area and left it with a rough broom finish. We snapped layout lines for the 6-foot grid and transferred elevation marks from adjacent finish floors.

We decided to dry-fit the stone for several reasons. Because of the labor involved, we hadn't cut many extra pieces. Color and texture of the stone pieces varied greatly, plus several pieces had slightly cracked corners. By dry-fitting, we could rearrange the pieces as needed, using the best ones out in the middle of the floor and taking advantage of broken pieces for cuts and edges. This required extra labor, but it reassured us that we had plenty of stone to finish the floor.

We dusted each piece clean before setting it in place and left a 3/4-inch joint between stones. It took about two weeks to get to this point.

Mud Time

The mason mixed a rich, thick mortar of one part cement to two parts sand, plus an acrylic fortifier. Because of the uneven thickness of the slabs, he worked one stone at a time, leveling from our reference marks and from adjacent stones (Figure 6, page 5). He used a pointing trowel called a slicker to press the mortar down tight between stones and to remove any excess mortar. We finished this stage by sponging the stones clean.

Sealer

We waited several days before sealing the stone, and as it fully dried, we could

Figure 3. OSB templates assisted in getting the best yield from the stone slabs.

Figure 4. Working from the back of the slabs, the crews used a circular saw equipped with a diamond blade to score the stone most of the way through.

Figure 5. By positioning the kerfed stone slabs (top) on the edge of the table, the workers were able to snap the scored line using a large piece of steel as a hammer (middle). A small scrap of sandstone served to smooth the sharp, rough edges (right).

see that quite a bit of cement residue and dirt remained on the stones. In the meantime, we researched and tested various sealants and finally settled on a solvent-based sealer with a color-enhancing matte-finish top coat (Figure 7). We used two coats of Miracle Sealants' 511 Porous Plus (800/350-1901; www.miracle-sealants.com) and one coat of their Mira Matte. Before sealing, we also used their recommended cleaner, Grout and Concrete Film Remover, to clean the stone, which we had to do twice.

After cleaning, we waited two days and then applied the first coat of sealant. That was a bit tricky because the sealant has the consistency of paint thinner, and since the stones were not yet grouted for the first coat, we had to keep the sealer from running onto the edges of the stone. We used foam paintbrushes and painted the floor stone by stone, wiping up excess sealer after ten minutes of drying time. This was a slow process and required patience on the part of my crew, as well as good ventilation, rubber gloves, eye protection, and kneepads.

Grout

The following day, the mason grouted the stone, carefully squeezing the grout into place from a grout bag and using the slicker to tool the joint. After sponge cleaning, we waited another day before sealing both the stone and the grout. We let everything dry overnight and then applied the Mira Matte finish coat, which brought out the color of the stone without making it shiny.

The finished floor was beautiful, but

Figure 6. The mason was responsible for cutting in around passages and other obstructions (left). Because the stone was of varying thickness, each piece had to be carefully leveled in reference to the finish floor height (above).

we still had all the wall finishes and trim to install. To protect the floors, we rolled out kraft paper, then put down a layer of 1/2-inch drywall. This makes a wonderful protective cover because it absorbs bumps and dings, has enough mass to stay in place, and can be swept off.

Cost

The cost of the 460-square-foot floor came out around $30 per square foot, not including supervision, broken down as follows:

8 tons of stone plus delivery, $4,225; 500 pounds of grout, $170; cleaner, sealer, and finish, $445; labor for sorting and cutting, 132 hours; dry-fitting, cleaning, sealing, 56 hours; mason's setting labor, $5,000.

Figure 7. After cleaning the stone with a proprietary cleaner, workers applied two coats of solvent-based sealer and one top coat to finish the job.

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