Stone Veneer on Concrete Block

The right mortar and care in laying stone are the keys to a beautiful job

by M. Scott Watkins

Lines of a springhouse. **The author's admiration for early American springhouses helped spawn the design of this stone-veneered storage building.**

As a builder and sometimes stonemason, I welcomed the chance a few years ago to design and build a small outbuilding with a lower story faced in stone veneer. Designed to capture the charm of an early American springhouse (photo facing page), this small-scale project was a break from the additions and renovations that are the mainstay for my three-man crew and me. The job gave us a chance to practice different skills. And with the help of our French-trained carpenter and mason Nicholas Lombard, the job took only three weeks from start to finish.

Barry and Virginia Wood needed a garden shed-playhouse where their six young children could store bikes, toys and sports equipment. Barry favored a stone storage shed reminiscent of the outbuildings of homesteads in rural Pennsylvania and New York. Virginia liked the more formal wood-frame outbuildings found in colonial Williamsburg, Virginia. My design blends the two. The first-story walls are stone veneer over concrete block, and the second-story walls are wood frame with hardboard siding and painted trim. Stone arches over the windows and the door, which we laid up over temporary wooden supports, add an attractive architectural detail.

Stone veneer offers a builder more design flexibility and lower costs than solid stone construction. If we had used solid stone, the 8-ft. by 11-ft. building would have required walls 16 in. thick or more for stability and to meet building codes. But walls that thick would have elevated labor costs and diminished floor space. Instead, the lower walls of the building are 6-in. stone veneer over 6-in. concrete block. Where the outside walls of the building are concealed by a timber retaining wall, we used 12-in. block and no veneer. The veneer looks almost identical to solid stone masonry on the outside (although veneer of less than 6 in. thick looks weak at the comers—you might call it stone wallpaper). The tricks to making the job come out right are the right mortar mix and careful placement of stone.

First, the block wall—Before any stone could go up, we had to construct the concrete-block inner wall for the first floor. While our apprentice, Evan Johnson, mixed mortar, stacked blocks and sorted square-edged stones for use on the corners, Lombard built the door and window bucks. Bucks are the wooden frames used to make rough openings in walls for doors or windows. We made ours from 2x8 pressure-treated southern yellow pine, rabbeting the corners and assembling the bucks with screws and waterproof glue. The bucks must be square so that windows and doors will fit. We braced ours with diagonal 1x material so that they wouldn't be distorted as we laid block, stone and mortar against them.

As Lombard and I laid up the blocks, we set, braced and anchored the bucks (top photo, this page). Over each buck we placed two steel lintels to carry the weight of the block. The L-shaped steel is ¼ in. thick and 3 in. on each side. Along each course of block, we placed corrugated metal wall ties every foot or so and inserted truss-shaped reinforcement wire in every third

Setting the bucks. **After the door buck has been made and braced, it is set into place and plumbed. Note the masonry buck anchor tie that has been screwed to the left side of the buck—it will help lock the frame to the masonry walls.**

Solid foundation for veneer. **The galvanized, corrugated wall ties are easily visible in mortar courses between the blocks. This photograph also shows the 6-in. overhang of the 2x12 mudsill.**

Bolting the mudsill. **After the concrete-block walls have been placed, they are filled with mortar. Then the 2x12 mudsill can be set over the ½-in. dia. anchor bolts. Note the steel lintels over the windows.**

Corners set first. **The stone corners were set first, then the author and his crew worked toward the middle of each wall. Mortar was carefully raked back from the face of the wall.**

A precise fit. **To build the arches, stones are first dry-fitted on top of a centering, which is a temporary support. Working from a skewback (a stone forming an inclined plane) on each end of the arch, the masons then set stones in mortar. Sand placed on the centering helps keep mortar from marring the underside of the stones in the arch.**

course. The corrugated wall ties we used were galvanized steel about ⅞ in. wide and 7 in. long. About one-third of the wall tie was put in the block wall, and the rest was left for the stone wall. These strips of metal are mortared into the stone veneer to tie the two walls together (bottom left photo, p. 57). We used masonry buck anchors to link window and door bucks to intersecting block and stone walls.

Once the 7-ft. high block walls had been completed, we filled the hollow cores of the blocks with pea-gravel concrete to increase the mass of the blocks. We also set ½-in. dia. anchor bolts in mortar in the top row of blocks so that we could install the treated pine mudsills (bottom right photo, p. 57).

We used 2x12 mudsills installed so that they overhang the blocks on the outside by 6 in. The overhang provided a guide for setting the stones plumb and true as the walls went up and helped make a smooth transition from stone to wood-frame construction above.

After the concrete-block walls were up, electricians installed conduits for electrical service and outlets on the outside of the block. Running electrical wires illustrates two of the advantages of veneer-over-block construction: The wire runs are easier to make than they are in solid stone construction, and when the stone veneer is applied over the block, the conduits are concealed.

Selecting the stone—Conventional wisdom discourages mixing different building stones in the same wall because it can be difficult to make a pleasing pattern of different colors and textures. But after a visit to a retail stoneyard in Sterling, Virginia, the Woods couldn't settle on any single type of stone for the building. They did narrow the choice to three favorites, so we bought Shenandoah fieldstone for its shape and texture, Pocono gold building stone for its color and Red Oak building stone for both color and texture. Shenandoah fieldstone is a natural-weathered sandstone that is collected in Virginia. Pocono gold is a sandstone quarried in eastern Pennsylvania, and Red Oak building stone is a quarried granite from southern Virginia. We added some Pennsylvania split-weatherface building stone, mainly for corners and window openings. Pennsylvania split weatherface is a natural fieldstone collected from the surface and split into shapes suitable for building. We also sprinkled in some native quartz that we found right on the site.

The Woods commented on how best to mix the colors, sizes and textures of these different stones. They preferred a random-sized, weathered stone and told me they wanted the building to look old. Our mix was heavy on the natural fieldstone for a weathered look (some of the stones still had lichen and moss on their faces) with a sprinkling of the others for a variety of color and texture.

In all, we needed about 3½ tons of stone for the veneer work (the stone weighs about 65 lb. per cu. ft.). We ordered far more than that. The surplus gave us plenty to choose from as the walls went up and gave the Woods enough stone for the dry-stacked retaining wall, walk paths and steps they built when we were through with the outbuilding. The stone was delivered wrapped in chicken wire and stacked on pallets. The stoneyard uses a special truck equipped with a boom, which makes unloading all that stone painless. Prices probably vary around the country, but for us the most expensive stone in the lot was the Pennsylvania split weatherface at about $250 a ton.

Mixing mortar and setting stone—There are perhaps as many stone-mortar recipes as stonemasons. For neatness, strength and workability, I prefer a relatively dry, almost crumbly, mix of one part masonry cement (type H), one part portland cement (type I) and six parts masonry sand. The masonry cement is a bagged mixture of portland cement and lime for workability. The straight portland cement adds strength. This 1-1-6 mixture produces a mortar called type M by the American Society for Testing and Materials. Of all mortars tested, type M is the strongest with a 28-day compressive strength of 2,500 psi. I mix the cement and the sand with just enough water for hydration and workability. If you squeeze a handful, no water will run out, but the surface of the resulting ball will be moist. I try to avoid smearing the stone faces so that I don't have a tedious cleanup later. Substituting one part pea gravel for sand helps stabilize the stones when building up a high area such as a corner.

Although it's strong and neat, this mortar mix has two drawbacks: It doesn't fill voids readily because it's so crumbly, and it can dry out before reaching maximum strength. We carefully compacted the mortar under, behind and be-

Photos this page: Mario Pareja

tween each stone to fill any voids. We also soaked the concrete block with water each morning and gently misted the set stones several times daily to ensure adequate water for complete hydration. (Hydration is a chemical process in which a material in a plastic state becomes solid, gains strength and hardens in the presence of water.)

Setting rough stone requires a different technique than building a block or brick wall where all of the pieces are of uniform thickness and height. To keep the walls plumb, we would set a stone in place and measure from the outside face of the concrete-block wall to the outside face of the stone. We tried to keep this distance to 6 in. We also held a straightedge—an 8-ft. 2x4—between a chalkline on the slab and the outside edge of the 2x12 mudsill to check the stone placement as we went. But there's a funny thing about working with stone: Setting pieces by eye is sometimes better than using a level or a straightedge. The rough faces of a stone can sometimes look wrong, even when the level says they're right. When in doubt, trust your eye.

We began at the corners and worked toward the middle, weaving the stones together and working up a foot or so at a time, avoiding continuous vertical joints. "One stone over two" (top photo, facing page) is the rule; the wall should look as if it would stand up without mortar between the stones. Once the corners were set, we filled in between them, setting stones mostly by eyeballing from corner to corner. We measured from the face of the concrete wall, using a straightedge only when in doubt.

Ideally, mortar joints should suit the scale of the building. In this case we tried for ½-in. wide joints, though some joints are smaller, and some are wider. Many stones needed minor trimming to fit their neighbors. We used brick hammers for chipping small high spots and a chisel and a sledge in a sand box for larger cuts. Some of the stones were not suitable for hand trimming because of their grain (for more on splitting stone, see *FHB* #49, pp. 54-57), so some joints are not as tight as we would have liked. We're not looking for perfection; we want a smooth, flowing look. Raking the joints back a consistent ½ in. helps achieve a smooth look. Store-bought tuck pointing trowels worked fine for longer joints. For smoothing short and irregular joints, we used a ¼-in. wide pointing trowel cut down to about 2 in. in length and the handle of a broken cement finishing trowel shaped on a grinder. Occasional misting with water from a garden hose helped us rake the joints to a smooth, dense face.

Stone arches—The arches we built over the door and the windows make an attractive detail on the building, and constructing them was one of my favorite parts of the job. The first step is to construct the temporary formwork, called a centering. The centering supports the arch stones (the voussoirs) during construction. We had previously cut extra arch-shaped head moldings for the window and door bucks to use as centerings. We clamped these pieces to the buck heads to provide a sturdy centering at each opening (bottom photo, facing page).

Pointing the soffit joints. **With the mortar set and the centering removed from the arches, the author points the mortar joints.**

Finishing the top. **A conventional wood-frame second story completes the building. The structure is sided with beaded hardboard.**

The next step was to lay up stones to the centering and form a skewback at each intersection of wall and arch. A skewback is a stone that forms an angle, like an inclined plane or wedge, to support the thrust of the arch stones. We let this work set up overnight.

The next morning we were ready to choose and set the arch stones on the centering. Studying the pile of wedge-shaped stones set aside and saved for the arches, I held a mental image of the completed arch and sorted out some 20 or so likely candidates. I assembled these stones in my mind in various combinations before trying them on the centering. I tried out the fit and decided on a combination that looked balanced and pleasing.

With the arch stones evenly spaced dry on the centering, I removed three or four stones and reset them with mortar. I worked my way across from each skewback toward the center, leaving the keystones (stones at the center of the arch) and the adjoining stones for last. To prevent excess mortar from marring the undersurface (soffit) of the arch, I squeezed a bed of moist sand onto the centering between each stone before packing the joints with mortar. Sand was also useful under some stones to keep them from shifting as I worked. After allowing the arches to set overnight, I removed the centering and cleaned and pointed the soffit joints (top photo, this page). The second-story playhouse (bottom photo, this page) was framed, finished and roofed conventionally with 2x4 walls and 2x6 rafters. □

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Top photo, this page: Mario Pareja