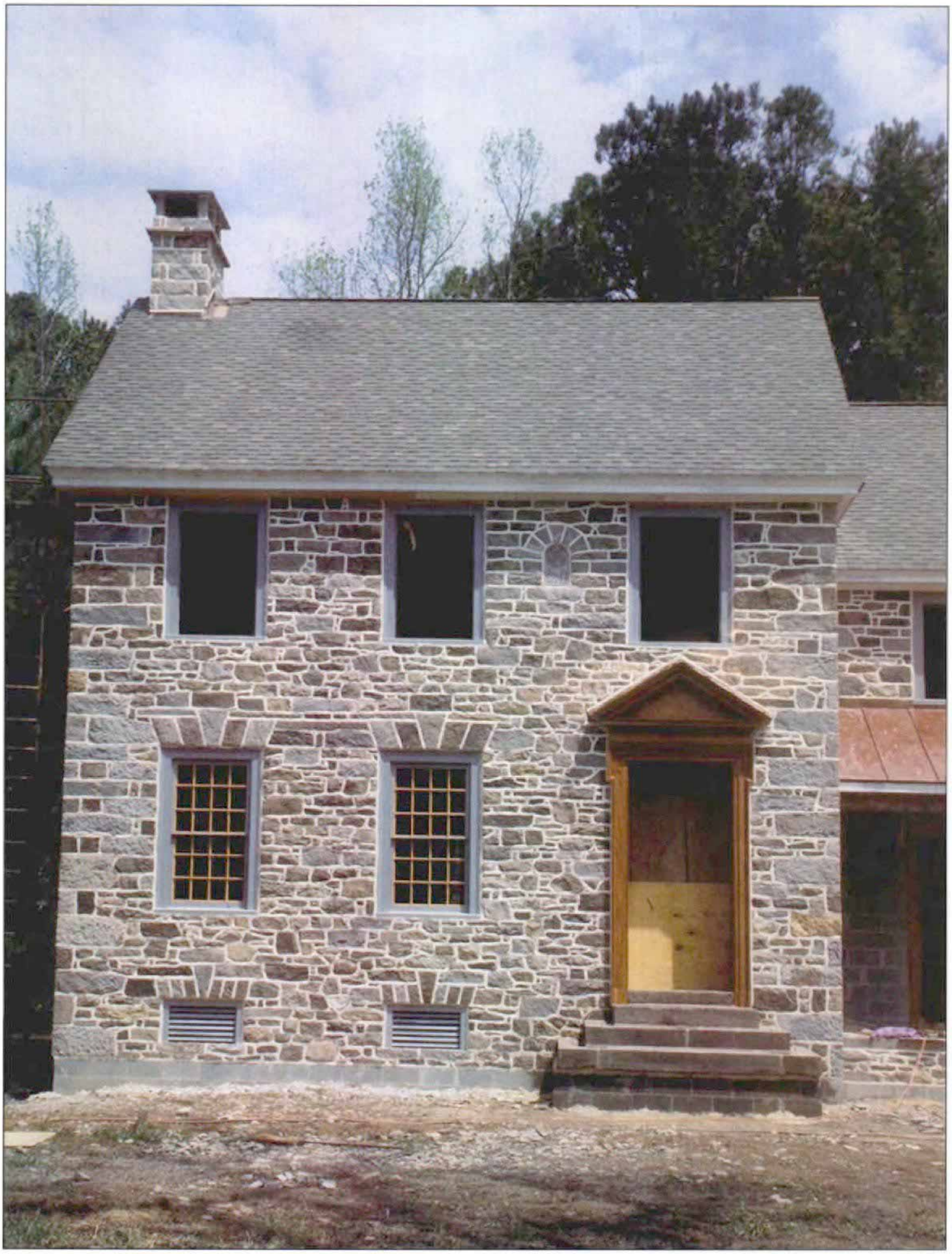
Laying up Stone Veneer

A masonry facade is an economical way to give wood-frame walls the look of solid stone

by Steven Snyder



Salvaged stone makes a new house look old. Patterned after a 17th-century house in Bucks County, Pennsylvania, this Mississippi home sports 45 tons of stone facade. Because freshly quarried stone would have looked too new, Pennsylvania sandstone was salvaged from an old barn, a dismantled prison, stone quarries and fields.

On a trip through Bucks County, Pennsylvania, in the early 1980s, Brenda and Buddy Williams noticed a stone house, that soon became something of an obsession. During subsequent visits over the next several years, they studied the house, which is called Burgess Lea. Built in 1689, the house is an exquisite example of early Quaker architecture, and it had been brought back to museumlike quality by its owner.

1 had become the resident stonemason at Burgess Lea, working there every year on jobs that took from a few weeks to a month or two. In 1989, the Williamses approached me with their plans to build a house in Mississippi patterned after Burgess Lea. They asked for my help in understanding the stone details of the house and how they could reproduce them economically. Fortunately, I had plenty of experience in reproducing period stonework in 6-in, and 8-in, veneers. Because of the huge economy of labor and materials in veneer construction, not to mention the insulating advantages of frame construction, the Williamses decided that veneer construction was the most reasonable way to go. An 8-in, veneer on a 2x6 frame could approach the 18-in. thick stone walls pf Burgess Lea.

After showing me their blueprints and thanking me for my input, they prepared to leave. On her way out, Brenda turned to me and asked if I would consider doing the stonework. I thought she was joking, but two years.later, 1 was on my way to Mississippi.

Salvaged stone doesn't go as far—The sandstone of the Williamses' house was to match that of Burgess Lea's. Because freshly quarried stone would not have matched the stones used on Burgess Lea, we used salvaged stone from Pennsylvania. As I collected the stone I'd need for the job, I considered its color, size and shape. An old barn, a dismantled prison, stone quarries and fields all yielded parts of the new house.

A ton of stone will cover 25 sq. ft. to 30 sq. ft. in an 8-in, veneer. Most quarries that sell building stone cut or split the pieces into 4-in., 6-in, or 8-in, widths for veneers. These stones don't produce much waste, so 30 sq. ft. per ton should be adequate for an 8-in, veneer. But because salvaged stone must be trimmed to width, it produces more waste, and I counted on covering only 25 sq. ft. per ton. My job was to veneer the facade of the main house (photo, facing page), the center addition and the foundation around the kitchen wing. The rest of the siding would be wood. With a little more than 1,100 sq. ft. of stonework, 1 needed approximately 45 tons of stone.

Some of the stone details could be reproduced using templates. Working with my longtime friend and helper, Tom Ashburn, I copied the arch stones and the shape of the date stone from Burgess Lea, then produced most of these pieces at my yard in Point Pleasant, Pa. then the stone, wrapped in stretch film on pallets and loaded onto two tractor-trailers, was off to Mississippi.

At the building site, the first job was to make sure we'd have a dry place to work. Mississippi had been getting heavy rain for several weeks by the time we arrived in January, so 1 tented the

Make a tent to stay dry. A simple 2x4 frame covered with a tarp allows work to move ahead, even during rainy weather. Line run through pulleys at the eaves of the house make raising and lowering the tarp simple.

Setting reference lines. The author's system for ensuring fiat, plumb walls starts with reference lines hung at the top two corners of the wall. The trim piece just below the soffit is installed so that its inside edge is 8 in. from the sheathing. A plumb line is dropped to the foundation from this point to mark the corner.

The horizontal string moves up and down. The author set two vertical stringlines at each corner. Between the inside lines he stretched a horizontal line that could be moved up and down on the vertical lines and that established the stone wall's plane. Galvanized metal ties then are nailed into studs.

Stone is heavy, so plan foundation accordingly. An extra-wide footing supports an extra-wide foundation wall that will carry both the framed wall and the stone veneer. The 8-in, wide shelf is capped with solid concrete block 4 in. thick, providing a strong surface for the start of the stone.

Getting windows away from the wall. Windows would be recessed too deeply if they were installed directly in the wood-frame wall. Instead, carpenters built extra boxes out of 2x material, nailed the boxes into the rough-frame openings and then set the windows outside the boxes. Reference lines ensured a uniform setback for windows in the finished stone-veneer wall.

work area. Using 2x4 rafters attached to a plate at the eaves, I enclosed the front of the main section of the house, running the 2x4s about 15 ft. out from the house (top photo, p.59). The ends of the rafters rested on a temporary stud wall built near the house. Three pulleys along the top of this open roof made retracting a tarp simple. Even during heavy rains, work proceeded comfortably. The tent was more than worth the effort.

Accurate reference lines mean a straight wall—With a dry work area assured, the next step was to establish accurate reference lines to use as we laid up the stone veneer on the main part of the house. It's easier and more accurate to establish the plane of the wall independently rather than take measurements from the sheathing. Even a slightly racked or out-of-plumb frame can cause some awkward problems for the stonemason later on.

I began setting these reference lines at the soffit. The innermost trim board should be hung so that the distance between its inside edge and the sheathed wall equals the thickness of the veneer, in this case 8 in. After establishing this point at each corner of the house, we pulled a line between the two points so that the trim would create a true line across the front of the house. Carpenters then hung the soffit and attached the trim along its lower edge. On the back edge of this trim piece at both upper corners (8 in. from the face of the sheathing), we set finish nails. From those points we dropped plumb lines to the foundation (bottom left photo, p. 59) and set masonry nails to receive the lines. (Experience suggests this not be done on a windy day!)

We pulled two separate lengths of braided nylon mason's line taut between top and bottom reference points at each corner. These two sets of lines marked the vertical face of the wall at each corner of the house. Next, we ran two horizontal lines across the face of the house. These horizontal lines were pulled fairly tight and were tied to one of the vertical lines at each corner (bottom right photo, p. 59). The horizontal lines could slide up and down on the vertical lines, providing movable reference lines. The plane defined by these lines as they are moved up and down is truly flat and plumb. The remaining vertical line at each corner, to which horizontal lines had *not* been attached, established a straight, plumb reference mark.

Setting windows and installing wall ties—Windows were to be recessed 1½ in. from the face of the finished wall. Carpenters used 2xs to box out the rough openings in the frame wall, then hung the finished windows in the openings at the correct setback from the reference lines (bottom photo, left). Because the windows were recessed, the horizontal reference lines could pass freely in front of them. Setting windows this way ensures that all windows will have the same setback from the finished stonework. Plywood protected the windows during construction.

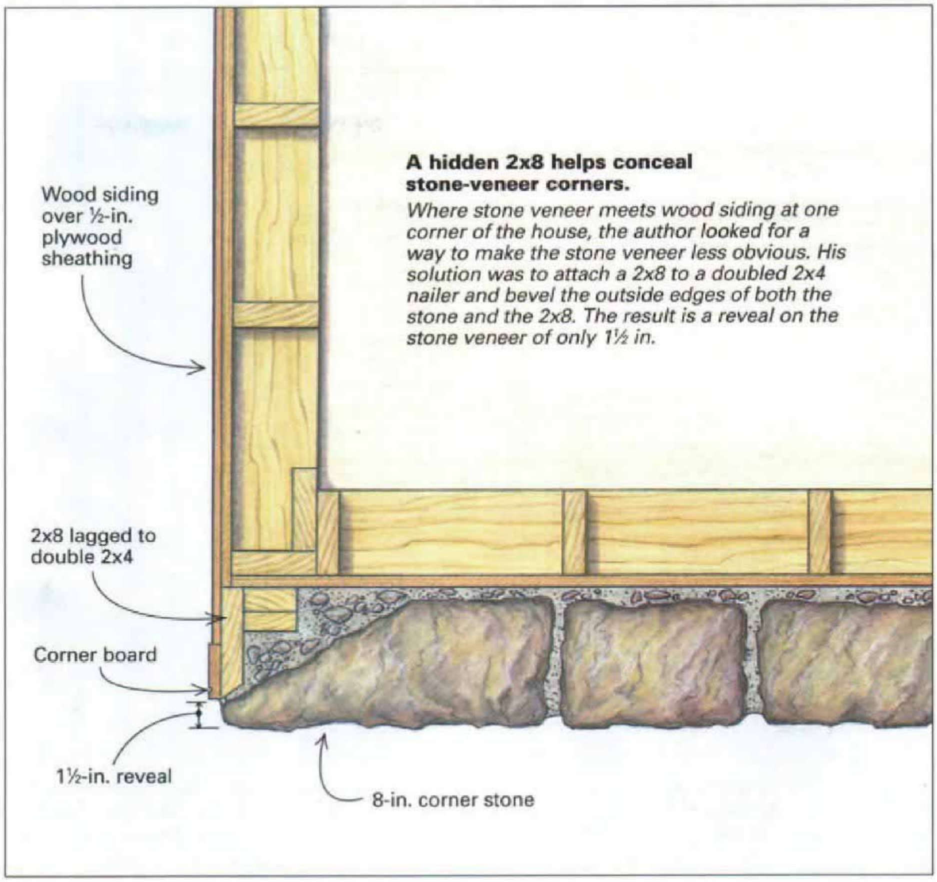
With windows set, we were ready to prepare the surface against which the stonework would be laid. The 2x6 frame wall had been sheathed in ½-in exterior plywood, and we covered that with

15-lb. roofing felt to provide a moisture barrier. We started at the bottom and moved up, overlapping each course of felt by 4 in. to 6 in.

Next came the anchoring system for the stone. We located the studs at the bottom of the wall and, using a 4-ft. level, drew plumb lines on the roofing felt up to the soffit, marking each stud. Heavy-gauge galvanized wall ties were then anchored to the frame using 2-in, galvanized roofing nails. The wall ties should be applied 16 in. o.c. both vertically and horizontally. Most of the wall ties are hung prior to laying the stone, and the ties generally fit between courses of stone. But because cornerstones tend to be bigger and less regular, I set wall ties there as I went along to make sure the wall ties fell in corner joints.

Stone-veneer walls need beefy foundations—The foundation was complete by the time we arrived, but it's important to note that stone-veneer walls require a lot of support. In normal-frame construction, the footing is several inches wider than the foundation wall that will carry the weight of the house. For a house that is to be veneered in stone, the foundation needs to be wide enough to carry the frame and the stone veneer.

Ideally, a 16-in. wide foundation wall on a 2-ft, wide footing is built up to within 6 in. of final grade. At that point, the wall would be stepped back 8 in. to create a shelf to carry the weight of the wall (top photo, facing page).



A hidden 2x8 helps conceal stone-veneer corners.

Where stone veneer meets wood siding at one corner of the house, the author looked for a way to make the stone veneer less obvious. His solution was to attach a 2x8 to a doubled 2x4 nailer and bevel the outside edges of both the stone and the 2x8. The result is a reveal on the stone veneer of only 1½ in.

Disguising veneer corner returns—One of the main objectives on this project was to create the look of solid-stone construction with veneer. But when a wall has been veneered, it is common to see a consistent 4-in., 6-in, or 8-in, return at the corners running straight up the building. Corners in a solid-stone house would be less uniform. Disguising this return would help us achieve the look we wanted.

At the southwest corner of the house, the stone wall would join wood siding. I wanted the corner board and the siding to come out nearly to the outside corner of the stone, thus covering most of the 8-in, thickness of the veneer. To accomplish this, we extended the sidewall at the corner (drawing above). After beveling one edge 60°, we lag bolted a 2x8 to a double 2x4 nailer set on the front wall, extending the sidewall to within 1½ in. of the face of the stone veneer.

The outside edges of the corner stones were chiseled back 30° and laid to the 2x8. The result is a 1½-in. reveal at the corner. The joint between stone and wood can be caulked.

Mortar should have lots of body—With our lines laid out and the surface prepared, we were ready to begin laying stone. Whether building a solid-stone wall or applying a stone veneer, I prefer a sticky mortar with a lot of body. I see mortar not as a bonding agent but as a stable fill that accommodates the irregularities of the stone. The old adage is, "Mortar doesn't hold stones together; it holds them apart." Good stone-laying techniques, not strong cement mortar, will result in a solid, long-lasting stone wall.

Lime adds body to mortar. My mix includes

Venting the crawlspace. To provide ventilation for the crawlspace beneath the house, wooden vent covers are set on sloped stone sills and set into the stone-veneer wall. Galvanized wall ties connect vent frames to stone, and copper flashing covers the tops of the frames.

Keystone lintels over windows. Wedge-shaped stones, patterned after those on a house in Pennsylvania, provide support over windows. Although flat rather than curved, the wedge shape prevents the stones from sagging into the window frame once the lintel is complete.

Drawing: Dan Thornton

A project for nights away from home. Faced with long stretches of time far from home, the author detailed this date stone by hand in the evenings. The date stone was set in a niche in the middle of the front wall of the house near the eaves.

Pointing keeps water out. Mortar is scraped out at the end of each day to a depth of 1 in. After the mortar has set completely, the entire job is pointed. Because of the mix used and the cold joint between the two layers of mortar, the building will not be difficult to repoint.

one part portland cement, two parts hydrated lime and six to nine parts sand. For mortar on this project, we used a sand with a small-pebble aggregate commonly known as concrete sand. The coarse sand combined with the high lime content to provide the body needed to support the stone as it was placed.

Starting walls with basement vents—The louvered basement vents on the main section were set first. Each vent has a 2-in, by 6-in, frame that needed a stone sill. The two-piece sills were cut and laid up to the proper height; then, each wood frame was set and leveled on the sill (left photo, p.61). The sills are sloped slightly away from the house to shed water. Wall ties anchor the frames in the stonework. The tops of the vent frames were flashed with copper. Once the frames were set, we laid stones up to the top of the frames. We built keystone lintels over the flat tops of the vent frames.then turned to the corner stones on the main wall.

The corner stones had been cut to rough dimensions in a quarry in Pennsylvania. They now needed to be hand-dressed and fitted into position. The common stonework in the house was roughly dressed (putting a flat face on stone) with a stone or brick hammer to match the stones on Burgess Lea, but the corner stones required a large face that needed to be brought into a single plane. This was accomplished with a 3-lb. hammer, a heavy point and a chisel. The 8-in. thick stones were 28 in. to 36 in. long and up to 14 in. high.

Laying wall stones up to reference lines- After putting down a bed of mortar, we set the stones into it. As each stone was adjusted into position, I sighted between the two lines running horizontally across the wall. Because 1 could move the two horizontal reference lines up and down, I got an accurate sense of where the plane of the wall should fall. The farthest protrusion of stone came to within ⅛ in. of the line.

I eased each stone down in the mortar bed until it touched the stone below it. With the mortar filling any voids, the stone is not likely to settle further as weight is added to it. All voids behind the stones should be filled with spalls of stone and mortar to prevent settling. In this manner, the amount of stonework laid in a day is limited not by the curing of the mortar but only by the stonemason's energy and ability.

At the end of each day, excess mortar was raked from between the stones to a depth of 1 in. By that time, the mortar had begun to set up and it fell away cleanly from the stonework. These 1-in, deep joints would be filled later when we pointed the walls.

Plan for windows—It's important to plan for windows, doors, rooflines and other architectural features so that the stone veneer will achieve a uniform flow. For example, it's distracting to see all 10-in, high corners and then a 4-in, high piece that is used to hit the top of a window or the top of a roofline. Over windows, stones should be used to break the vertical lines that the window frames create.

The tops of the window frames were flashed with copper in preparation for the lintels. On this project, keystone lintels were used (right photo, p. 61), eliminating the need for angle iron. However, if angle iron is used, I suggest that it be recessed at least 1 in. behind the front of the window frame and pointed over. Even painted iron will rust, and it's better off hidden from view.

As we headed up between the upper windows, we made a niche for the date stone. Date stones are traditional on period stone houses in Pennsylvania. Learning to carve them has been a natural extension of my work and has proved to be valuable. In fact, I had carved the date stone for Burgess Lea in 1985. Because I had a lot of free time in the evenings in Mississippi, I carved this date stone while the house was being built (left photo, this page). The design of the date stone originated in Pennsylvania. It means good luck, and the symbol appears throughout the Williamses' house. Because the date stone wasn't finished when we were ready for it, we built a plywood dummy and set it temporarily in the niche we created to hold a place for the stone. After the arch stones were set, the dummy was removed, and the real date stone was inserted.

The stonework was then brought up to the roofline. We tucked the top stones behind the trim and forced mortar up on top of the last course of stone and down between the stone and the trim. This created a solid top course and provided a backing for pointing.

Point stone after mortar is well-set—Once the stone had been laid up to the roofline and was washed down with water, we were ready for pointing. (Had there been a heavy mortar buildup on the stonework, I would have washed it down with a muriatic-acid mixture.) Pointing weatherproofs and protects the less-stable building mortar within (right photo, this page).

It's important to stress that building and pointing are two separate processes. Pointing is much like adding a final coat of stucco to the brown coat. The building mortar should be well-set before it is pointed. Years down the road, stonework will need to be repointed, and if the process was handled correctly at the start, it should be simple to remove the original pointing without damaging the stonework or the underlying mortar (for more on re-pointing, see *FHB* #86, pp. 68-71). I have had the unpleasant experience of trying to chop out mortar in work where the mason pointed at the end of each day's work. Because of the liberal use of portland cement in most masonry work today, difficult re-pointing is not an experience I wish to pass on to future stonemasons.

I used a rich lime/sand mixture, which resulted in a bright white, slightly raised pointing. The mixture consisted of six parts of fine sand, one part white portland cement and two parts lime. You must keep the proportions consistent to maintain uniform color in the pointing. The mortar is mixed to the consistency of soft cream cheese and applied with a ¾-in. wide trowel. □

Steven Snyder is a stonemason and sculptor in Point Pleasant, Pa. Photos by the author.