

Putting Down a Brick Floor

The mason's craft is easier when
the bricks are laid on a horizontal surface

by Bob Syvanen



Brick floors are experiencing a revival. The material used only for patios or walkways 10 years ago is moving inside the house. There are good reasons for this. The color, texture and pattern that brick brings to a room can't be duplicated with vinyl or wood. And brick is a logical choice for a passive-solar building, because it increases the thermal mass while offering a more finished look than a concrete slab.

Laying a brick floor sounds risky if you're not skilled with a trowel and a brick hammer. But after watching master mason John Hilley lay the floor in a house I'm building in Brewster, Mass., I'm convinced that it's not too difficult. As with any job, if you know the tricks, the battle is half over.

A brick floor laid with mortar is different from a wall or a patio. First, you can ignore plumb and just concentrate on level. Second, you don't have to contend with the shifting, subsiding backyard quagmire that is the substrate for most patios. A brick floor should be laid on a concrete slab, which is flat and solid; or on a wood floor that has been beefed up to take the extra weight of the bricks and stiffened so that its flexibility won't crack the mortar joints.

Brick—If you think that brick is brick, and that your only decision will be how many to buy, you'll change your mind when you hit your first masonry-supply yard. Bricks come in many styles, colors and prices. They run anywhere from 30¢ each to 50¢ each or more. If your floor extends out into the weather, use paver bricks. The surfaces of pavers are sealed, so the bricks won't spall when it freezes. If your floor is inside, anything that strikes your fancy will do.

Used bricks make a very nice floor but they're getting scarce, and as a result, expensive. You never know exactly how much waste you'll get when you scale the old mortar off used brick, but plan on buying at least 3,000 used bricks to get 2,000 usable ones. For new

4x8 bricks, you should figure 4½ bricks per square foot of floor and then add at least 5% for waste.

Since a standard brick weighs about 4½ lb. and you're going to need a lot of them, you'll want them delivered to a convenient place. Most yards bring the bricks on pallets to your job site, and if the delivery truck is equipped with a hydraulic arm, you're even better off. The arm lifts the wood pallets off the truck and sets them down anywhere you say. A skilled driver can just about put the bricks in your back pocket.

Use brick tongs for hauling the bricks from the pallets. Brick tongs are simple tubular-steel contraptions that will carry between 6 and 10 bricks at a time by holding them in compression. At about \$16, using tongs beats weaving around the site with a pile of bricks stacked up against your forearm.

Layout—Although there are many patterns or bonds that bricks can be laid in, the *running bond* is still the easiest and one of the most attractive. The joints between the bricks in each course are offset from the joints in adjacent courses by a half brick. This means that each course begins with either a half brick or a whole brick. After sweeping the slab absolutely clean, determine which direction the brick courses will run. You can then begin the rough layout of the floor with a tape measure.

To avoid having to cut a course of narrow bricks at the end of the room, you may need to adjust the width of the joints. Laying out to a full course at the end of the room is time well spent. Do your figuring on paper by adding an ideal joint width, for example, ¼ in., to the width of your brick and dividing the total length of the room by this sum. Then confirm your calculation by *dry coursing*—laying a full row of bricks along the length of the room without mortar to test-fit the layout. Pick carefully for representative bricks, since they can differ considerably in length and width. Remember that thin joints look better than fat

ones when you're making adjustments between courses; and that you'll get another inch at each wall to play with because the wall finish and baseboards that will be installed later will cover that much more of the floor.

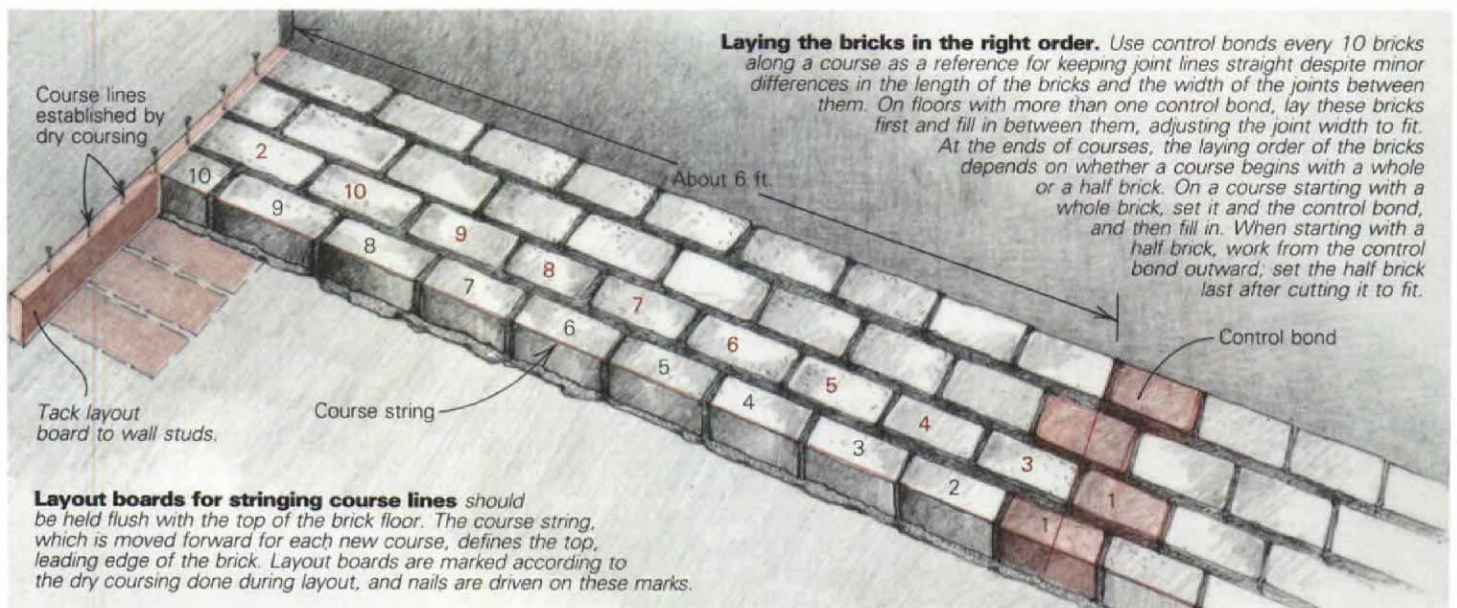
Once your dry coursing has been adjusted so that the joints are even, nail 1x or 2x layout boards to the wall studs along each side of the room so that their tops are even with the top of the finished brick floor (drawing, below). Mark the leading edge of each course on the board, and drive a nail into the top of the board at each of these marks for a string line. After laying a course, move the string forward one nail on each side of the room for the next course. This line represents both the finished height of the floor and the leading edge of the course, leaving very little for you to eyeball.

A layout board can also be cantilevered off the top of bricks that have already been laid. This setup works well when an exterior wall takes a jog, making the room narrower, and ending a run of layout boards. Course lines are marked on the end of the board that projects out to the unlaidd part of the floor, and the course string is attached so it rides on the bottom edge of the board. This maintains the same finished floor height as layout boards held flush with the top of the bricks.

You should dry-lay a test course along the width of the room, too. You will be starting with a half brick or a whole brick on one end, and adjusting the joint width between the ends of the bricks to determine the length of the brick on the other end. It won't always work out to half and whole bricks, but the less cutting you have to do, the easier the job will be. Don't end a course with a very short brick.

For anything wider than a closet or a hallway, use *control bonds* to make sure that the bricks are being spaced uniformly. These are bricks whose ends are laid to a string as a reference every 6 ft. or so (about 10 bricks) within each course. This in effect breaks a long course up into several small courses.

The control bonds and end bricks are the



first bricks to be laid in each course. The rest are filled in to fit. This way, the joints of every other course at the control bond will form a straight line, and the cut bricks at the end of courses, as well as the width of the mortar joints at the ends of the bricks, can be kept fairly consistent from course to course. Try to place control bonds in highly visible spots such as stairways and entries, and string them just as you did the course lines.

Stock the floor once you've completed your layout. This way you can stretch strings and get to know the peculiarities of the room and the slab you'll be working on before you begin littering it with bricks. Using brick tongs, distribute the bricks so that they will be within easy reach when you begin to work. Keep in mind that several layers of bricks on a pallet, or even the whole thing, can be a very different color from the rest of the load. Mix these colors and tones as you stock them on the floor so that your floor doesn't end up with big patches of only dark or light bricks.

Tools—A brick floor is laid with standard mason's tools (photo below). In addition to a 4-ft. level, a tape measure and nylon string, you'll need a brick hammer to break the brick to length at the end of a course. It has a square, flat head and a long, flat chisel peen on the other end, and is made of tempered steel. Brick hammers come in various weights. They have either steel, fiberglass or wooden handles, and cost about \$15.

Brick trowels also cost about \$15, and are made with wood or plastic grips. There are two basic shapes: the London and the Philadelphia. Most brick masons prefer the London pattern, an elongated diamond shape with its heel farther forward on the trowel than the Philadelphia. London patterns come with either a narrow or a wide heel. The narrow heel is fine for brick since less mortar needs to be carried by the trowel than for stone or concrete blocks.

You'll need a jointer for smoothing and shaping the mortar between the bricks. This tool looks like an elongated steel S, and is gripped in the middle. Each end of the tool has a different profile.

Tools of the trade. Brick tongs, top, make stocking the floor with bricks much easier. The trowel, jointer and brick hammer below it are the basic tools used to lay the floor.



Mortar—The mortar between the bricks in your floor makes it permanent, and provides a visual relief from the brick itself. In this case, it is a mixture of masonry cement, sand and water. Use a shovel and buckets to proportion the ingredients for the mortar. Mix your mortar with a hoe in a mortar box or a wheelbarrow. An easier way to mix is with a mechanical cement mixer. Do your mixing outside where you are free to hose out your mixer at the end of the day, but keep the fresh mortar out of the hot sun.

The amount you'll need depends on two things: how much bedding is required for the slab you are working on, and the thickness of the joints between bricks. If your slab is flat and level, the bed of mortar under the bricks will be fairly uniform. A good bed is $\frac{3}{8}$ in. thick, and no less than $\frac{1}{4}$ in. However, a serious hog, or hump, in the floor can double the amount of mortar, because you will need to bring the bricks for the rest of the floor up to this level with a much thicker bedding.

The width of the joints between bricks is the other factor that affects how much masonry cement and sand to order. Joints look bigger than they really are because bricks are molded and don't have hard crisp edges. A $\frac{1}{4}$ -in. joint after finishing will look $\frac{3}{8}$ in. wide, which is a nice size. Figure on one bag of masonry cement for every 100 bricks if your slab is uniform and your joints are $\frac{1}{4}$ in. wide. You will need $1\frac{1}{2}$ cu. ft. to 2 cu. ft. of sand per bag of masonry cement.

The consistency of your mortar will have a lot to do with your success in laying bricks. Mortar should be firm enough to support a brick as bedding, yet soft enough to compress easily at the joints. A soupy mix will lay down, or self-level, in the wheelbarrow. A mix that's too stiff will support itself even when it's stirred into the shape of a breaking wave. A workable mix is the consistency of whipped cream, and the secret to mixing it that way is adding water to the dry ingredients in small amounts, and lots of practice.

A good mason mixes only the amount of mortar that can be made with one bag of masonry cement at one time. With this amount, the consistency is easy to control. A batch will last about three or four hours before setting up. Temper the mortar every 15 minutes by working it briskly with a hoe or shovel and adding a little water if necessary. The books say not to add water, but all masons do. Whether the mud is mixed with a mechanical mixer or in a tray with a mortar hoe, it's best loaded into a wheelbarrow because it is convenient to move around the work area, and it's easy to scoop out of.

Laying the bricks—You are ready to begin laying bricks when the mortar is mixed and the control-bond strings and the first-course string are stretched. For courses that begin with a full brick, lay the control bonds first, the full end brick second, and then fill in between, as shown in the drawing on the previous page. Start from the control bond and work outward. If the course starts with a half

brick, lay the control bond first, and then work from this brick out toward the ends, cutting the bricks on either end to fit. A little gain or loss that accrues as a result of the inconsistent length of the bricks can be offset by adjusting the size of the last brick.

You cut the last brick in a course with the mason's hammer. Hold the brick in your hand, and hit it sharply once or twice directly over your palm. This usually does it, but some bricks need a shot on both sides. Sometimes they break where you want, and other times you end up with a handful of brick shards. You'll get better with practice, but until you do, order enough extra brick so that each blow isn't critical. If the brick fractures at an angle, set it down on a hard surface and use small, chipping strokes with the hammer to straighten out the line of cut.

Another tool for cutting brick that requires a less practiced stroke is the brick set. This wide chisel is placed on the brick where you want it to fracture, and struck with a hammer (for more on breaking brick, see *FHB* #3, p. 43). A brick set will cost you about \$6. Plan to waste a few bricks using this tool as well.

You can tell a journeyman from an inexperienced mason just by watching his trowel hand as he picks up a load of mortar and places it. There is a familiarity with the material that is unmistakable. First, using the back of his trowel in the surface of the mortar, he will stroke away from his body. This creates a mound of mortar in the wheelbarrow. With the face of the trowel he scoops a load of mortar in an upward motion, then drops his trowel arm abruptly, ridding the trowel of excess mortar. What remains won't slide off the trowel even if it's turned upside down. The technique is stroke away, scoop up, and settle.

The first trowel of mortar should be placed on the floor for bedding. Thrown is more accurate, though this too takes a bit of practice. Then choose a brick. If your bricks are water struck on one face, this face should be laid up because its slightly glossy surface is less porous and will wear better. With brick styles that are water struck on all sides, or not at all, just choose the best face.

With the brick in one hand and the trowel in the other, pick up a thin line of mortar using the same stroke as before, and wipe it on the edge of the brick. As you get more experienced, it will almost look like you're throwing the mortar on. Unless you overload the brick, the mortar shouldn't slip off while you are handling it. Trial and error will tell you how much mortar to use. Finish buttering the brick by loading up the end that will butt the previously laid brick.

To set the brick in place correctly, all of its joints need to be in compression. This is one of the secrets of good brickwork, and the way to accomplish this is the *shove joint*. The brick should be held out from its ultimate resting place and square to it. As you begin to bed it down, the brick should sit slightly above the string line on the mound of mortar underneath it (photos facing page). Using your thumb, push the side of the brick toward the



The shove joint. Above, mason John Hilley beds a brick in a running bond. It is buttered on one side and one end with mortar, and will sit well above the course string on the bedding mortar until it is pressed and tapped down. This string indicates the top of the floor, and the leading edge of each course. It is moved ahead one nail on the layout boards at each side of the room after a course is completed. The brick is leveled to the string by a gentle tapping with the butt of the trowel (above right), while pressure is applied with the left hand. This compression is the key to a tight, permanent brick floor. The lines of mortar between bricks are jointed, right, when they reach the consistency of putty, using excess mortar on the surface of the brick. The mortar is fed into the joints and compressed with a jointer. This is done twice on each course to produce smooth and compact mortar joints.



previously laid bricks and use the butt of the trowel to tap the brick down until its face is just below the string. If the brick is too low anywhere, lift it out and load the bed with more mortar. Then press the brick into place again. Also use the trowel handle to tap the end of the brick until the width of the joint between it and the previously laid brick is correct. During all of this you should be pushing the side of the brick with your thumb. This pressure keeps the brick from settling unevenly, and keeps the joints in compression. Don't worry if the mortar doesn't rise all the way to the surface in every spot along the joints. The holes will get filled in later.

Scrape away any excess mortar with the edge of your trowel. This mortar can be allowed to dry a little and be used for jointing. Try not to smear the mortar on the surface of the bricks, but if you do, don't worry. It can be washed off later after it sets up.

Jointing—The brick joints are ready to be filled and jointed when the mortar between the bricks has the consistency of putty. Test it by pressing the mortar with your finger. You can use the scrapings on the surface of the brick to fill the joints if they hold together when you squeeze them in your hand. They shouldn't be soft like fresh mortar, or they won't compress when jointed. Dried or crumbly mortar shouldn't be used either.

The joints should be filled and compressed in two stages. For the first fill, feed the mortar into the joint and press it with the jointer

(photo above right). Work your way along the course, filling and pressing. Then go back to the beginning of the course for a second fill and a final jointing. Jointing not only increases the strength and durability of the mortar joints, but it also gives the floor a smoother, more uniform appearance. Do the final jointing with smooth, level strokes. Use your whole arm, not just your wrist.

Cleanup—Let the mortar set for a week before cleaning. You can wait longer, but the brick will get harder to clean. First, scrape off heavy spots of mortar with the chisel peen of a mason's hammer. To remove any mortar smeared on the surface of the bricks, you will need to use a 20% solution of muriatic acid. Mix the acid in a bucket by adding one part acid to four parts water. Always add the acid to the water, and make sure that you are wearing eye protection and heavy-duty, acid-resistant rubber gloves. You will also need running water from a garden hose close by. Open as many doors and windows as you can for ventilation. Muriatic acid is nasty stuff—treat it with respect and caution.

The acid will soften the mortar spots, enabling you to scrub them off the surface of the bricks. For this you will need a short, stiff-bristled brush for hand-scrubbing, and a 9-in. stiff-bristled brush on a long handle. Before you begin, flood the whole floor with water until the bricks are saturated. This keeps the acid action on the surface where it can be controlled, and then washed off as soon as it

has penetrated the mortar smears. The bricks will look shiny when they are saturated, dull when they are beginning to dry out. Keep the bricks saturated during the entire process so the acid won't burn the mortar. Get a helper to operate the water hose.

As soon as you mix the acid solution, test its action in some hidden spot—under the stairs or behind the chimney. The joints will have a soapy appearance as long as muriatic acid is present. It's best to do this job systematically and work small areas. Dip the brush into the acid solution and then begin scrubbing the saturated bricks. As soon as you have covered a few square feet, hose it down until all the foaming stops. Then hose it a bit more, saturate the next area, and move on with the bucket and brush. After the entire floor has been scrubbed and rinsed, hose it down one more time. If any muriatic acid remains, it will continue to break down the mortar.

Brick floors should be sealed, but not until all the moisture has left the bricks and the mortar joints. Wait at least a month. If you get impatient and seal a brick floor with moisture in it, the sealer won't bond. The best product I've used for sealing brick is Hydrozo Water Repellent #7 (Hydrozo Coatings Co., Box 80879, Lincoln, Neb. 68501). Five gallons will do the average floor and will cost a little over \$80. Put on two coats, letting each one dry for 24 hours. I follow this with a coating made of equal parts of turpentine and Valspar polyurethane varnish (The Valspar Corp., 1101 South Third, Minneapolis, Minn. 55440). □