French-Door Retrofit

Opening up a wall to bring the outdoors in

by David Strawderman

What we know today as French doors were originally considered tall casement windows that simply reached to the floor. They appeared in the late 17th century at Versailles—Louis XIV's grandiose headquarters southwest of Paris. There they overlooked immense gardens that required the rerouting of a river for adequate irrigation.

French doors are still a gracious architectural element that can enhance the appreciation of a garden—no matter what its size. A pair of them make the connection more immediate than even a large window. My clients for the job illustrated in this article, Luis and Carol Fondavila, wanted a closer link between their breakfast/dining area and their beautifully landscaped backyard. Here's how I removed the existing double-hung window, created a 6-ft. wide opening and filled it with a pair of new French doors.

Headers and rough openings—Creating a new opening in a bearing wall requires that you shift the load from the existing studs to a post-and-beam carrier. The beam, or header, is typically a 4x timber or a couple of 2xs with a piece of ½-in. plywood sandwiched between. Then the entire assembly is spiked together with 16d nails. The depth of the header depends upon the span and load, and the common rule of thumb for single-story dwellings is that 1 in. of header depth will span 1 ft. For example, an 8-in. deep header will span 8 ft. A house with a typical 8-ft. ceiling and standard 6-ft. 8-in. doors will usually have enough space between the top plates and the door framing for a 12-in. deep header.

But what about two-story houses, like this one? I use common sense, look at what's in the wall and act accordingly. In this case, the existing 4-ft. wide window had a single 2x8 header. I decided that a double 2x8 would be adequate to span 6 ft. If you have any doubts about this kind of a calculation, however, have an engineer or architect size the header.

Another structural consideration besides the header depth is the foundation bearing capac-

French doors. Traditional French doors consist of a pair of multi-light doors, both of which are operable. The primary door (in this pair, the one on the left) carries the lockset. The secondary door holds the strike plate, and is held fast by deadbolts.

ity. The loads from the new header are passed by way of the trimmer studs to the foundation. This creates "point loads" on the foundation, and if they're considerable they can crack an otherwise adequate footing or a foundation atop weak soils. The Fondavilas' house has a massive foundation with 10-in. stemwalls in perfect condition. I was satisfied that the new loads from a 6-ft. long header weren't going to cause a problem. If the header span is longer than about 7 ft., however, I consult an engineer or an architect if I'm at all in doubt about the integrity of the structure. It's important that this be addressed *before* any holes are cut in the walls. Reinforcing the foundation at the post-bearing points can be messy, expensive and time-consuming, especially after the loads have already been altered.

Once I've considered the structural part of the equation, I turn my attention to utility obstructions. Telephone and television lines are minor items that are easily dealt with. Electrical wires, gas and water lines hidden in the wall can present more serious problems. First I check the exterior wall for utility entrances. If a gas line or an electric service is entering the house at precisely the spot where my client wants a new set of doors, I explain that the utility companies will have to relocate them, thus adding considerable expense. Perhaps the doors can be moved a little to accommodate the obstructions.

The interior wall offers clues to probable electrical wiring paths. Outlets typically have to be relocated, and light switches moved to the side of the new opening. Sometimes a look above the proposed door location, in the attic for example, will reveal evidence of wiring in the stud bays that will be affected. I also check in the basement or crawl space.

The most difficult utilities to relocate are gas, water and waste lines. Fortunately, most plumbing lines run through interior walls. If you are putting doors in a wall that already has a window, chances are you won't encounter plumbing lines in the portion of wall below the window. There are, of course, exceptions to this, such as long trap arms from a sink, or vent pipes that take a horizontal jog across a wall. Implanting a set of doors in a blank wall runs a greater risk of running into water and gas lines. To assess the likelihood of finding pipes, take a look in the crawl space or basement under the section of wall in question. Again, you may want to move a door a few feet this way or that to avoid relocating pipes. Upstairs bathrooms and vents in the roof can give you additional clues as you learn about where the pipes may be buried in the walls. Keep in mind that the more obstructions there are, the higher the cost will be. When I am satisfied that cutting and framing the rough opening is feasible, I address the design of the finished unit.

Style and costs—A pair of French doors engage each other in three basic ways: the hinged pair; a hinged door with a fixed sidelight panel; and a sliding pair. Deciding which kind to install is usually a matter of style.

For the classic look and a generous doorway that can be opened to the breezes, nothing compares with the traditional pair of hinged, true divided-light doors (photo facing page). Their delicate muntin grids are compatible with the windows of most homes built before the '50s. On the downside, a pair of hinged doors are tough to install and they are often considered the Achilles' heel of weatherization. It can be hard to keep wind-driven rain from getting through the gap between the doors, though properly installed compression weatherstripping can do the job. Another way to protect them from the weather is to install an awning-type canopy over them, such as the one designed by Bill Mastin *(FHB* #63, p. 56).

French doors with fixed sidelights are easier to weatherize, and I charge considerably less to install them because they have only one operable door. They can be a good solution when space is tight.

Sliding French doors can be very wide because they ride on rollers. Sliders aren't susceptible to being blown shut by the wind and they don't get in the way when they're open. Sliders without muntins are compatible with modern architectural styles.

The main floor of the Fondavilas' house, built in the '20s, already had several pairs of 7-ft. tall French doors. Even though they were no longer available off-the-shelf, my clients wished to duplicate them, as well as the hardware.

When I don't have to match existing doors, I buy standard units from my local supplier. There I can select from stock doors that have from 10 to 15 lights per door, and are either 2 ft. 6 in. or 3 ft. wide by 6 ft. 8 in. tail. These doors cost between $140 and $200 each. They are made of solid vertical-grain Douglas fir, and their single-glazed, tempered lights are double-bedded, which means they are glazed on both sides to help keep out the rain. I can buy the same doors prehung with jambs and a threshold for around $800 from local door shops, or pay about double that for some nationally known brands. For about $120 worth of material I can make my own jamb set and prehang the doors in less than half a day.

Doors that have to be made from scratch cost a lot more. One bid for the Fondavila doors came in at $650 apiece. I settled on a pair that cost $375 per door. Prehung custom door units rise in cost accordingly. In any case, locksets are extra.

If you order a custom set of prehung doors, your supplier will need to know the details of the doors, the vertical dimension from the bottom of the threshold to the top of the jamb, the horizontal dimension from the outside edges of the jambs, and the depth of the jamb from the finished interior wall to the finished exterior. The rough opening should allow a ¼-in. gap at each side and at the top.

Out with the old. **A reciprocating saw makes short work of old plaster, studs and the nails that hold them together.**

Hardware—A pair of French doors may open out or in, and the door you open first is called the primary door (or the active leaf). The primary door holds the entry hardware, while the secondary door is secured to the upper jamb and threshold with sliding bolts. These bolts can be surface-mounted on the interior door side, such as those in the Fondavilas' house, or mortised into the door edge. The entry and deadbolt sets are the same as those used for single doors, and their strike plates are secured to the secondary door. The secondary door typically has nonoperable knobs to match the active leaf.

The closed doors need a stop where they meet in the middle. There are two basic solutions and the T-astragal is by far the most typical (top drawing, p. 45). This molding strip is secured to one of the door edges. It's best to orient the crossbar of the T to the exterior

Using a Carborundum masonry blade ensures a straight, clean cut in a stucco wall.

The new header is inserted into its cavity in the old wall. Note how the cripple studs over the window have been cut in a horizontal line so that they can bear equally on the header.

New trimmer studs support the weight of the header and its load, and define the edge of the rough opening. Here the door jambs are lifted into position and aligned with the interior wall.

side so that it will conceal the latchbolt and protect against the weather. The astragal may be on the secondary or primary door, depending on whether it swings in or out.

The alternative is a set of doors with interlocking, rabbeted edges. Although this configuration is elegant, the entry hardware for it is limited. The only company I know of that makes locksets and strikeplates suitable for rabbeted doors is Baldwin Hardware Corp. (P. O. Box 15048, Reading, Pa. 19612; 215-777-7811).

Jamb assembly—The jambs I use are made out of fir, and they are typically 1⅛ in. thick with a ½-in. deep rabbet along one edge to create an integral door stop. The interior edge of most jambs is flush with the interior finished wall, and the exterior edge is flush with the exterior wall. The width normally falls between 4¼ in. and 5¾ in. With the Fondavila job I had a 9½-in. deep wall, so I used 5¾-in. wide jambs and made up the difference with trim and stucco mold (drawing, p. 46).

A flat, open area is useful for layout and building the jamb set. I begin with the head jamb by marking off the dimensions of the doors, the astragal and its space and the hinge spaces (top drawing, facing page) on a piece of jamb stock. If I'm installing a threshold, its length is equal to the outside dimension of the assembled jamb plus the length of the ears. The side jamb fits into a tapered rabbet at the ends of the threshold, next to the ears (bottom drawing, facing page).

The length of the side jamb equals the door height, plus the thickness of the top jamb, the depth of the tapered rabbet in the threshold

and a ⅛-in. gap above and below the door for clearance. If I'm installing a sweep or a gasket at the bottom of the door, I'll adjust that gap accordingly.

To join the jambs at the top corners, I cut a rabbet in the end of the side jambs and screw them to each end of the head jamb with three 3-in. drywall screws (bottom drawing). Before assembly, I lay down a bead of Polyseamseal caulk in the joint. The caulk serves as both a glue and a waterproofing agent (Polyseamseal, Darworth Co., 50 Tower La., Avon, Conn. 06001; 800-624-7767).

Incidentally, before I commit myself to a certain door height, I make sure the doors are square. They aren't always, and finding out after cutting the jambs is no fun.

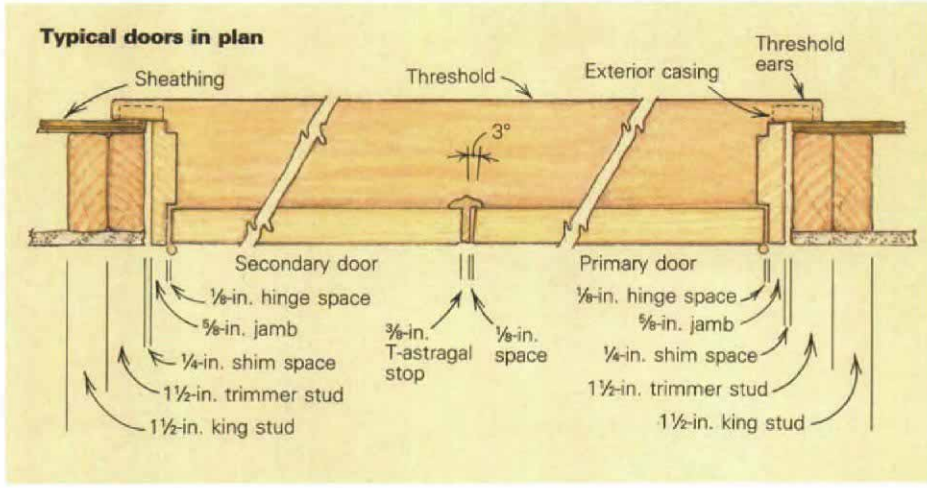
Once I've assembled the jamb frame, I square it up and reinforce it with some diagonal 1x2s screwed into the edges of the jambs opposite the hinge side. The jamb frame can now be moved around pretty easily, and I lift it up onto the bench for easier access.

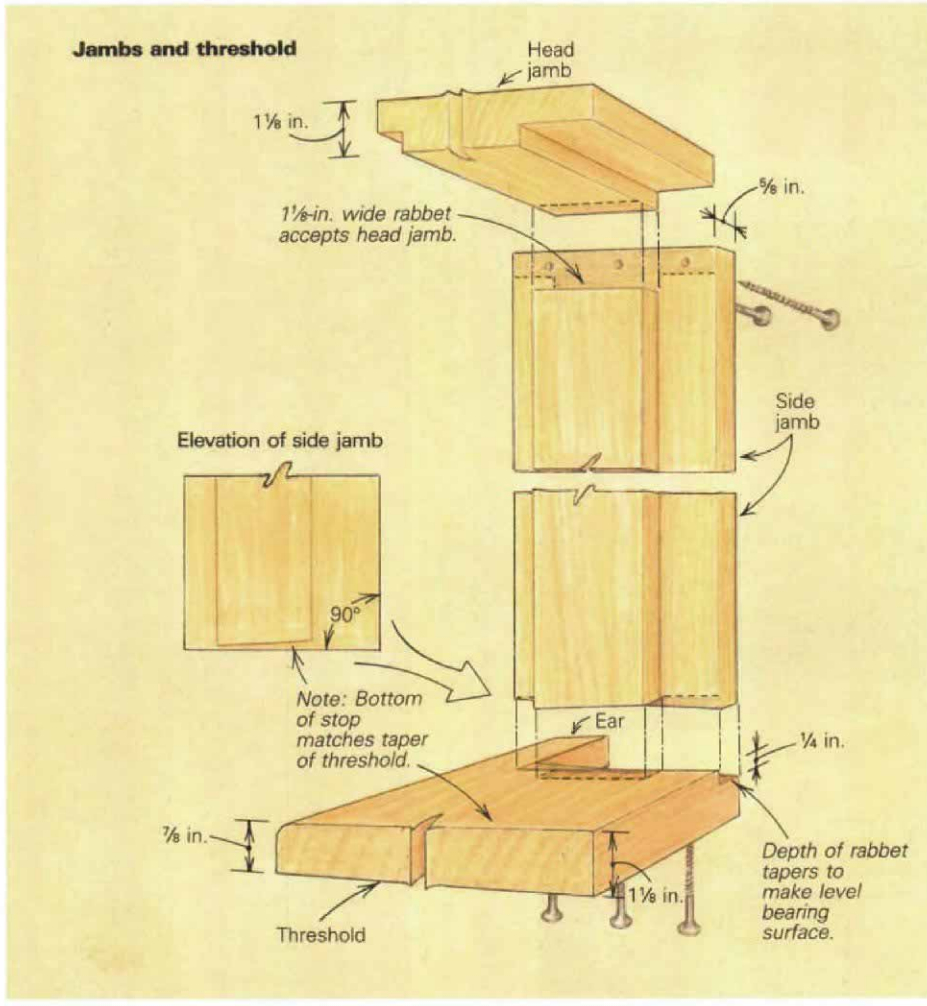
I typically install compression weatherstripping along the inside edge of the doorstops. I need to do this before the hinge gains are routed to allow space for the thickness of the weatherstripping. To cut the grooves for the weatherstripping, I use a slick little router made expressly for the purpose by Weatherbead Insulation Systems Inc. (5321 Deny Ave. F, Agoura Hills, Calif. 91301; 800-966-0159). For more on this tool, refer to my review in *FHB* #60, p. 92.

While the jamb is on the bench, I bring the doors alongside so I can mortise the hinges. I use a Bosch 83038 Router Template (Robert Bosch Power Tool Corp., One Hundred Bosch Blvd., New Bern, N. C. 28562-4097; 919-636-4200) for this operation. With it, I can rout the gains for both the jambs and the doors at the same time. I use three hinges per door.

Next I affix the T-astragal to the correct door, and put a 3° bevel on the edge of the door that meets it. Because small misalignments are difficult to correct after installation, I wait until the unit is installed to position the lockset and security bolts.

If the client has decided that the doors should be painted instead of varnished or stained, now is the time to prepare them for priming by removing all putty and caulk around the glass. After sanding the doors and jambs with 120-grit sandpaper, I apply two coats of Kilz Oil Base Primer (Masterchem Industries Inc., P. O. Box 368, Barnhart, Mo. 63012; 800-325-3552).





Opening up the wall—I begin work on the wall from the inside. This allows me to reposition any utilities, remove wallboard or plaster, and sometimes even assemble the new framing before breaching the exterior wall.

I locate the center of the new opening, and lay out the width of the door jambs, adding ¼ in. on each side. For an 8-ft. wall I draw vertical lines floor to ceiling on both sides. Then I use a reciprocating saw with a short plaster-cutting blade to cut the drywall or plaster. I hold the saw at a shallow angle to avoid hidden electrical wires (use a dust mask and goggles). If the vibration from the saw is cracking the plaster, I screw a 1x3 to the wall outside the cut line to hold the plaster together during the cut.

On an 8-ft. wall I remove the drywall or plaster all the way to the ceiling, and using a utility knife, score the inside corner where the wall meets the ceiling. At the Fondavilas' house, however, I stopped the cut at the point where the top of the new header would meet the old studs to avoid having to make a much larger patch in the 10-ft. wall (photo, p. 43). The wall's innards are now exposed, and if pipes or wires need to be moved, now is the time to do so.

Here's the typical sequence I follow when I'm making a rough opening 7 ft. wide or less. After removing the drywall or plaster, I use my reciprocating saw to cut in half the studs that need to be removed, and unless I find some evidence of concentrated loading from above (like a pinched sawblade as I crosscut a stud), I don't bother with shoring up the ceiling. A metal-cutting blade in the reciprocating saw makes it easy to cut the siding and sheathing

Drawings: Bob Goodfellow

nails away from the studs as I remove them.

Next I install the king studs on either side of the opening, slipping them into the wall cavity. I run a bead of Polyseamseal on the exterior edges of the new studs, and nail through the existing wall material into them after toenailing the studs to the top and bottom plates. The distance between the king studs should be 3½ in. more than the width of the finished unit. This distance equals the length of the new header.

In an upper corner, I make a notch in the drywall or plaster to allow easy insertion of the header. I tack the trimmer stud opposite the notch to its king stud, leaning its bottom out to allow ample clearance for the header. Then I hoist the header into place, put the trimmer under the other end of the header and nail it off. I tap the slanted trimmer stud into its final position and nail it securely to the king stud. If the new header doesn't reach all the way to the top plate, I put in blocks or cripple studs to restore the load path of the old studs. All the new and old framing members should be toenailed securely to one another.

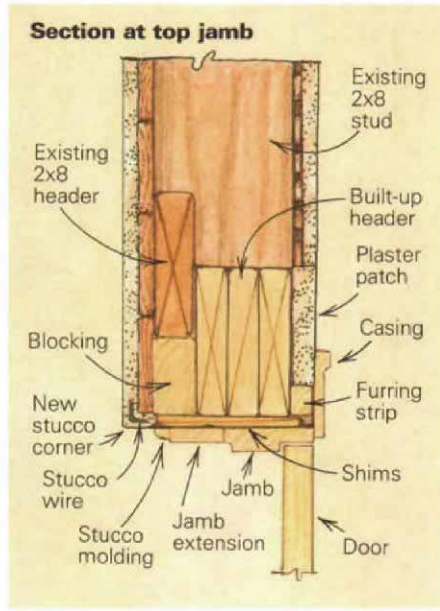
If the opening is over 7 ft., I put up some temporary shoring a couple of feet in from the wall to help carry the weight of any ceiling joists that might be affected by the removal of the old studs. The shoring consists of a temporary 2x6 top and bottom plate the length of the new opening, along with some studs wedged in place and tacked to stay put while the new header is installed (for more on retrofitting headers, see *FHB* #62, pp. 85-87).

That's the theory, and often it follows that order. The Fondavila job had its exceptions. The height of the walls made it impossible to install new king studs without tearing out a lot more wall, so I made the header longer than it would normally be and turned the existing studs on either side of the opening into the king studs. I made a built-up header out of a pair 2x8s with 2x8 blocks between them to help fill the stud cavity and lifted the header into position (top right photo, p. 44). The new header is toenailed to the old studs, and it bears on the new trimmer studs that frame the rough opening (bottom photo, p. 44).

Punching through—I begin the final process early in the day to ensure ample time to have a locked set of doors in place by evening. I begin by locating the corners of the opening on the outside of the house. A long ½-in. bit works nicely (I used a masonry bit for this job because of the stucco siding). Holes drilled, I move outside and snap chalklines for the cuts. They should be flush with the inside edge of the trimmer studs and the bottom edge of the header.

My helper, Larry Furniss, used a circular saw with a carborundum masonry blade to cut through the stucco finish (top left photo, p. 44). It's dirty work but cutting stucco this way ensures accuracy and leaves the remaining stucco undamaged. Then I used a reciprocating saw to sever the wood sheathing behind the stucco and any nails or studs that held this portion of the wall to the house.

Other exterior wall surfaces and molding details are cut differently. Cuts in horizontal siding, for example, sometimes need to be a few inches outside the rough opening to accommodate recessed molding. Bullnosed stucco-returns with no exterior wood molding need to be cut flush, then taken back several inches so new stucco wire can be tied in.



The jamb and doors are brought into square with one another by inserting shims and blocks between the trimmers, header and the jamb.

Installing the jambs—After removing the doors, Larry and I moved the jamb frame into place and lifted it into the opening from the outside until its interior edge was flush with the plane of the wall (bottom photo, p. 44). I didn't put a threshold on the Fondavilas' doors because they plan to have a mason create a cast-concrete sill and stoop to match the other doors. If the threshold is affixed to the jambs, however, its ears should be flush with the exterior finish. Check the jamb against the interior and exterior surfaces. Most walls have variations, so you'll have to average them out. When remodeling, I've found it better to conform to existing conditions than to follow my impulse and make everything plumb and level.

I wedge the jamb at the top to hold it in place without any nails while I hang the doors. Instead of leveling and squaring the frame, I use the doors as a guide to "squareness." If properly prehung, small in-and-out and up-and-down adjustments to the jambs will bring the doors into proper alignment (photo below). I shim the frame on each side 4 in. from the top and bottom, above and below the top and bottom hinges and near the center hinge. I shim the top jamb and threshold near each corner and at 2-ft. intervals. I used to secure the jambs with 16d coated finish nails, but have switched to countersunk 3-in. drywall screws. Once I've got the jambs anchored to the trimmers so that the doors operate properly, I install the lockset, deadbolt and surface bolts.

Touching up—I usually patch any holes that I've had to make in the interior walls with pieces of drywall. Because the Fondavilas have plaster-on-lath walls, however, I had my subcontractor use expanded metal lath affixed to the new header in order to anchor a plaster patch. Like many a plaster wall, these are kind of wavy, so I installed the new door casings and baseboards before the final coat of plaster. That allowed my plasterer to bring the finish coat right to the edge of the casings, filling up the gaps caused by the wavy walls.

On the outside, I sealed around the framing and jambs with foam insulation. Then I nailed on the exterior trim and stucco molding, and readied it for the stucco man with a couple of coats of primer.□

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