Retrofitting an Oversize Door in Structural Brick

A row house gets a new, 900-pound, triple-glazed slider

BY ROB CORBO

In the 30-plus years we've been working in the Hoboken, N.J., area, we have replaced the window-door-window configuration on the rear wall of numerous row houses with a three-panel slider, mainly to bring in more light and provide better access to the backyard, but also to replace worn-out components, as many of these homes were built before 1900. Most Hoboken row houses were built with structural brick, so opening up the rear wall requires adding steel to support at least one upper story and sometimes two.

Typically, two pieces of steel are installed: The first is set into place on the inside half of the wall while the outer half of the brick wall remains intact; once that piece is fully supported, the outer brick is removed and the second piece of steel is installed (see "Retrofitting a Steel Header," Jun/12).

Most of the projects we've done have been similar, but with each one there always seems to be something different that needs to be dealt with. This job was no exception, on two counts: The exterior wall had three wythes of brick instead of two, and the door was larger (and heavier) than usual—a 9-by-9-foot, triple-glazed Zola slider that weighed upward of 900 pounds (see Zola Window Specs, page 75). And there were also a couple of surprises along the way that required an on-the-spot change of plan.

Photos: David White and Rob Corbo

UNLOADING THE DOOR

The owner wanted to maximize the door's height, which meant locating the top as close to the ceiling joists as possible while allowing for trim. In many row houses, we would have had to work around a 9-inch plaster crown molding, but in this case, a 3-inch wood crown had been installed during a previous kitchen remodel. Accounting for that plus trim, we had room for a 111-inch-tall door.

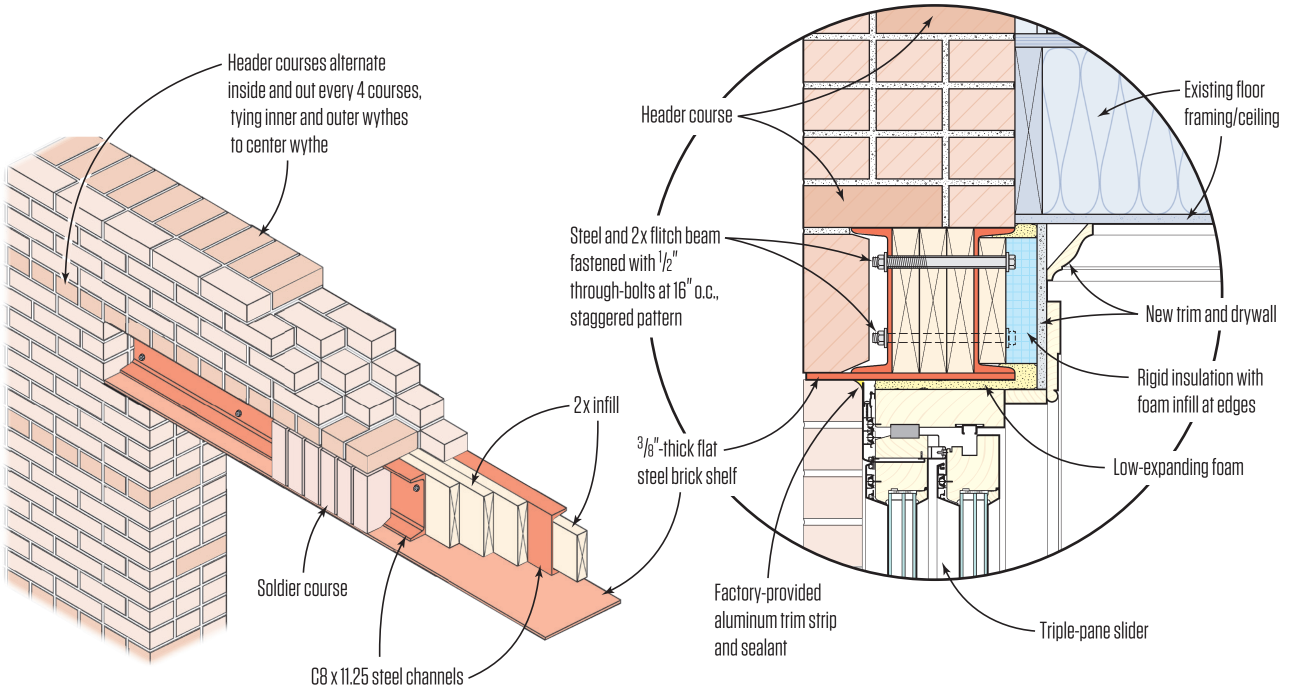
Lead time on a custom Zola door can be as long as 15 weeks, so we didn't start work on the house until the day the door was delivered to the site. There was no alley in back, so the semi carrying the door parked on the street in five "emergency no parking" spaces I had reserved to ensure that the end of the truck box was in front of the house. Even though the door was delivered as a five-piece knock-down, the largest component—the fixed panel—weighed nearly 500 pounds, too heavy for me and my crew to comfortably handle. So I hired three boiler technicians recommended by my plumber, who uses them to unload, assemble, and disassemble large boilers and other heavy equipment. They unloaded the two panels one at a time from the semi **(1)** onto dollies, rolled them to the front stairs, and carried them up the stairs and through the front entry door. Back on the dollies, the panels were carefully rolled to the back of the house, out the back door **(2)**, and onto the deck, where we wrapped all the pieces with movers blankets and tarps to protect them while the structural work was being done. Start to finish, unloading the door took about 3½ hours.

DEMOLITION

In many Hoboken row-house floor plans, the kitchen is at the back, and we usually end up altering the rear wall for a new door as part of a kitchen remodel. But in this case, the existing kitchen was staying in place, and the architect dimensioned the door to fit snugly between the existing cabinets along the sidewalls. The brick jamb of the rear window would define one side of the new door, so the cabinets that abutted the rear wall in the corner next to the window stayed in place. On the opposite wall, we temporarily removed the corner pantry cabinet, the refrigerator, and the wine rack above it to make room for the structural work. And we relocated a radiator from the middle of the rear wall, ultimately substituting an electric squirrel-cage toe-kick heater in the base cabinet next to the window.

Because the demolition would be dusty work, we erected two temporary barriers, using poly with a pole system and zipper doors.

Flitch Beam for a Three-Wythe Structural Brick Wall



We placed one barrier about 4 feet from the rear wall, up against the kitchen island **(3)**, and left it in place the whole time. The other barrier ran full-width on the other end of the island and provided extra protection. Once the demolition was finished, we took this barrier down. In the meantime, both barriers had zipper doors to give us access to the interior of the house, and the homeowners access to the kitchen, which was mostly still usable (though we'd moved the refrigerator into the living room for easier access). A third barrier went up on the rear wall itself.

We found a big surprise when we removed the corner pantry cabinet and drywall in the corner: A window that was bricked-up on the outside still held the original double-hung on the inside **(4)**. We had planned for one jamb of the new door to fall in the middle of this window, assuming that the opening had been filled solid with brick that could support one end of the flitch beam. But only a single veneer layer of brick had been used to close up the window.

This required a change in plans. The two steel channels that were to be installed—one inside, then one outside—were originally designed to be equal lengths. Given this new wrinkle, we ordered the inside beam about 16 inches longer—long enough to be temporarily supported by the brick jamb on the corner side of the bricked-up window.

INSIDE STEEL

Installing a flitch beam in two steps ensures that the building is structurally supported at all times. Given three wythes of brick, the plan called for two C8x11.25 beams (8-inch-high steel channels weighing 11.25 pounds per foot) with full-length 2-by material sandwiched between them. Everything would be through-bolted together to form a flitch beam that would span about 10 feet.

We began by removing the inner and middle wythes of brick above the rear window **(5)**. The height of the door plus the steel channels determined which course to start with. We cleared away enough brick to make room for the beam plus about an inch of clearance to allow us to shim and eventually grout above and below the flanges.

Danny DoCouto was the foreman on the job. He's union-trained and he knows his way around steel and the brick in these old row houses. He likes to do the brick demolition himself because it gives him an opportunity evaluate the masonry and adjust his work plan if he finds problems. He found this wall to be very fragile. This,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combined with the discovery at the bricked-up window, prompted him to proceed carefully when removing brick, looking for loose mortar or cracks in brick that would be load bearing.

When it came time to hoist the first, longer steel channel into position, we blocked it up on the brick to the left of the kitchen window and shimmed the top flange along its length **(6)**. At the other end, Danny wasn't confident that the brick bearing surface was large enough or strong enough to support the load even temporarily, so we set a Lally column in front of the window to temporarily support the steel **(7)**. This also bought us time to complete almost all the masonry work before we had to remove the bricked-up window. We reset the Lally later to make room for the new door jamb.

Before lifting the steel into position, Danny drilled both steel channels with a series of matching ⅝-inch holes staggered every 16 inches on-center, with a stacked pair on each end. Usually our steel supplier punches these holes, but I needed the steel quickly—because we had lost time figuring out how to handle the bricked-up window—and my supplier was unusually busy. So he cut and delivered the steel, and we primed and drilled it on site. Danny used three different sizes of Irwin black oxide high-speed bits and a Makita ¾-inch hammer drill. He first drilled a small ¼-inch pilot hole, drilled again with a ⅜-inch bit, and finished it off with a ⅝-inch bit. Total drilling time for all 20 holes was about 2 hours.

With the inside steel in position and temporarily supported, Danny grouted the top flange in all of the spaces between shims. After waiting a day for the mortar to set, he removed the shims and grouted the remaining spaces, then moved outside.

OUTSIDE STEEL

Again we started above the kitchen window, removing the remaining single course of brick, and adding blocking down to the granite lintel to provide temporary support **(8)**. The goal here was to remove just enough to be able to slip the 2-by stock and second steel channel into place. But Danny also removed some brick in a few courses higher up that had come loose, again using scrap lumber to provide temporary support.

Danny chose to drill the dimensional lumber in place, using the holes in the steel as guides. After sliding the three 2-bys into position, he carefully installed the outer steel channel with one end aligned as closely as possible with the end of the inner channel. Working from the inside, he drilled ⅝-inch holes into the wood, keeping the drill as square to the work as possible. When the bit

reached the outer channel, he punched in from the outside. Then he used ½-inch through-bolts to fasten the steel and wood together at both ends and in every third hole in between; he finished the bolting after the brickwork was completed.

At this point, the outer steel channel, which was shorter than the inner channel, was cantilevered above the bricked-over window **(9)**, and supported by the Lally column set under the inner channel. At the other end, the beam was blocked down to the existing brick **(10)**.

BRICKWORK

Before continuing the demolition of the brick beneath the beam, Danny wanted to finish all of the masonry work above the beam, given the fragile condition of that part of the wall. As mentioned earlier, this house had three wythes of structural brick. Most of the field bricks, or "stretchers," were set in the familiar American bond, with a header course every seven courses. Header courses, in which the bricks are set with the short end exposed, hold the wall together across its width. In the case of a three-wythe wall, header courses alternate inside and outside every four courses, tying the inner and outer wythes to the center wythe (see "Flitch Beam for a Three-Wythe Structural Brick Wall," page 73).

ZOLA DOOR SPECS

Zola sliding doors are custom-made and can be shipped fully assembled in sizes up to 20 feet wide and 8 feet high; larger sizes—up to just under 40 feet by 11 feet (WxH)—are delivered as a knock-down kit.

The "Thermo Clad" model installed on this project was 108 ¾ by 111 inches (2,819 mm x 2,762 mm, WxH), but was delivered knocked-down so it would fit through the existing doorways. It has 1 ⅞-inch-thick triple-glazed safety glass (U-value of 0.09 Btu/hr/sf, SHGC 0.54), a nominal 2x8 frame, and a thermally broken aluminum sill.

The aluminum cladding is held off the rails and stiles by clips, creating what the company calls a "rainscreen cladding" that is designed to promote better drainage and drying. The company offers 20 standard colors for cladding, and up to 300 others are available for an upcharge. The rails and stiles on the door we installed were pine, but oak and meranti (similar to mahogany) are available at added cost. The wood can be either stained or painted (15 or 300 colors to choose from, respectively).

The lift-slide hardware is manufactured in Germany by Roto and works something like the hardware for a sliding door on a van: When the door is closed, it's weathertight; when it's opened, it lifts up out of its seals to permit smooth sliding. And the door installed on this project was indeed smooth: The 40-inch-wide (1,038 mm) panel weighed nearly 300 pounds but easily slid open and closed with pressure from just one finger.

Exterior remote-controlled shading or bug screens that roll out of sight when not in use are available as an option.

For more information on Zola doors, visit zolawindows.com/doors —*The JLC editors*


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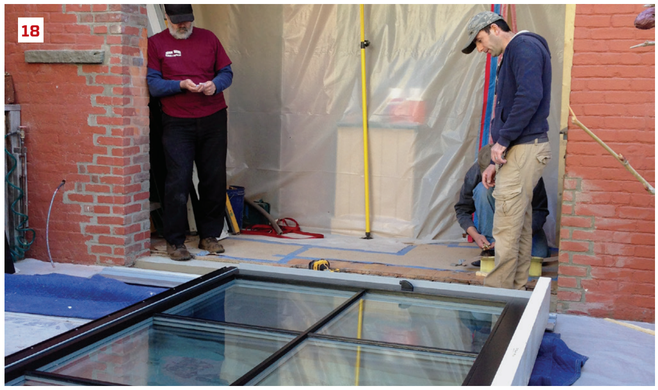
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We started rebricking with the course immediately above the steel, which turned out to be a header course **(11 and cover photo)**. We temporarily supported one section with scrap 2-by blocking while we pieced in others until all of the missing brick above the beam was replaced **(12)**. Then we toothed in the brick under the beam at the kitchen window jamb.

We wanted to finish the lintel with a soldier course, but first we had to finish defining the rough opening for the new door so we could tie the brick together at the corners. We removed the kitchen window and the surrounding brick, leaving the outer wythe intact; this would define one side of the opening **(13)**. The face brick extended past the inner wythe by about 3 inches, leaving just enough room to install a double 2x8 rough jamb stock fastened with Tapcons. At the other end, after removing the door, we reset the temporary Lally column just inside the new opening **(14)** and rebricked the jamb, preserving the American bond and header courses **(15)**. We left the old granite window sill in place because we didn't want to risk compromising the structure by removing and replacing more brick directly under the bearing point of the steel.

To provide a flat, level surface at the door sill, we built a shallow form over the brick and placed a stiff pea gravel concrete mix about 2 inches deep and reinforced with steel mesh **(16)**. The plan called for the door jambs to be set flush with the new drywall, so we aligned the concrete flush with the brick wall on the inside, which would leave the door set back one wythe. After the door was in, we mortared a piece of bluestone underneath the sill to complete the threshhold **(27, page 78)**.

With the rough door opening complete and the beam still temporarily supported, we removed the remaining blocks from under the beam ends, added brick where necessary, and mortared all the joints. The final bit of brickwork was to install the soldier course at the lintel, resting the bricks on a shelf welded to the bottoms of the two steel channels **(17)**. Now it was time to turn our attention once again to the door.

ASSEMBLING THE DOOR

Because we needed to carry the door through two doorways with limited height clearance, Zola shipped it knocked down, but the unit had been assembled and tested at the factory. This is standard practice, because it would be impractical to lift a really large door into place fully assembled—the lift-slide model we were installing can be fabricated up to 26 feet long. Although the jamb can


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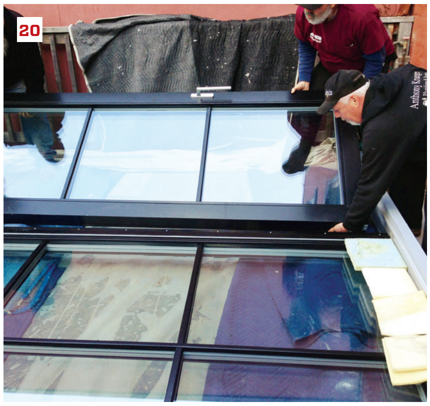
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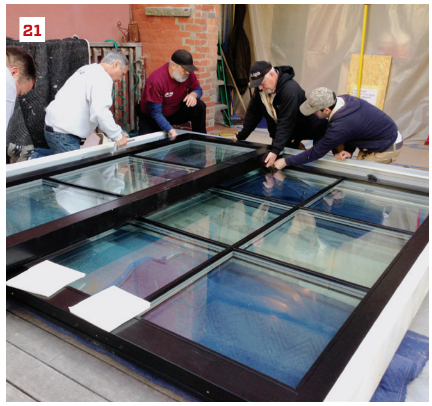
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be installed first and panels set in place, we thought it would be easier to put the heavy panels together working flat on the deck. At about 9 feet square and 900 pounds, the door was still within the limits of what we believed we could lift into place.

The first step was to put the frame together. This time I hired four boiler technicians to help with the assembly. We laid two rows of doubled 2-bys on the deck parallel to the brick wall and more or less centered in front of the opening. Even though the door was shipped with protective tape covering the aluminum cladding, for extra protection we covered the lumber with thick movers blankets, then laid the larger fixed panel down, roughly aligning it with the opening **(18)**. This panel had been shipped with the jamb still attached, so the next step was to add the other jamb and attach the sill to the jambs through the bottom using screws provided by Zola **(19)**.

That was the easy part. Placing the active panel was a little trickier, partly because it weighed about 300 pounds and we had to carefully lower it straight down over the frame while standing awkwardly around the frame **(20)**, and partly because the concealed wheels and seals had to be properly aligned with the track in the sill and also with the stile of the fixed panel. After we shimmed the frame to ensure that it was as flat as possible, it was a five-man job to get the panel into its proper position **(21)**. We used a couple of pieces of foam to cushion the doors, and prepared for the worst. It took some coordination (and maybe a bit of luck), but the door found the track easily. We locked it into position, then aligned the headpiece with the wheels and seals of the active panel and fastened it through the top into the jambs.

INSTALLING THE DOOR

The last step in our plan was to lift and stand the door onto wood blocks positioned in front of the opening, then slide it inch by inch into the opening. It took seven men—two positioned inside, just in case, and five outside—to lift the door and stand it up **(22)**. (The photo on page 71 seems to show four, but the pair of arms under the guy on the left belong to me.) Getting it waist high was easy—getting it from there to above our shoulders was the real test. But it turns out we had more than enough muscle to stand it up without any one person having to strain himself. The door was solid and didn't rack at all.

We had dimensioned the rough opening so as to leave ½-inch clearance all around the door. That meant we couldn't tilt it into


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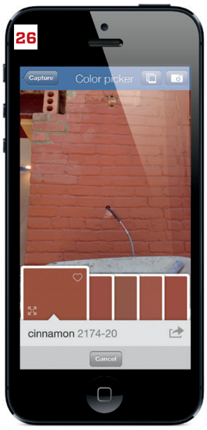

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the opening—it had to go in upright. I had anticipated that this might not be easy, so I brought along four pairs of heavy-gauge 6-inch angle irons, which came in handy. After several short lift-and-slide maneuvers to get the door partly into the opening **(23)**, we fastened two angle irons back-to-back on each jamb, inside and out. That gave us something to grab onto so we could lift the door and inch it fully into the opening **(24)**. Before we started moving the door into the opening, we squeezed most of a tube of silicone onto the bottom of the door's aluminum threshold, incrementally adding more caulk to the masonry threshold as we slid the door into place.

We checked the door for square and level, then fastened it with wood screws on one side and Tapcons on the other. We countersunk the screws into the jambs and finished them later with plugs and paint. To close up the gap on the outside, Zola provides aluminum strips that snap onto the jamb. We applied a bead of caulk in the gap before installing them.

Inside, we sealed the perimeter with low-expanding foam, then hung and taped the drywall. After reinstalling the pantry cabinet, refrigerator, and wine rack **(25)**, we trimmed the door out with 5½-inch one-piece molding. It met the cabinet facing on the pantry side, and we scribed it around the countertop and along the front of the base cabinet on the other side. Outside we matched the existing paint color on the existing brick using the Benjamin Moore "Color Capture" app **(26)**, and mounted the sconce lighting **(27)**.

Start to finish, we spent about four weeks on demolition, masonry, and door installation. That includes some downtime for inclement weather, a half-day to unload and stow the door, a long morning to assemble the door and lift it into place, and a day to attach the hardware, trim the door out, and add the bluestone sill.

The project was not inexpensive: The door cost about $12,000 (which the owner paid for directly, along with the architect's fee), and my part of the work ran about $21,000. But as you can see from the photos, the dramatic difference the door made to the appearance of the house, and the additional light it provides in the kitchen, as well as the improved thermal performance and access to the back deck, made it more than worthwhile for the owners and their family (and their pets).

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