On the Job

Replacing a Wood Beam With Steel

As a company that specializes in custom cabinets and kitchens, Lewis & Weldon Custom Builders in Hyannis, Mass., sometimes finds itself taking a detour to installation. On a sales call last fall, project manager Jason Cox commented on a structural beam running the length of the great-room ceiling. The clients agreed that it was visually distracting and would detract from the look of their new kitchen. The LVL beam had been installed in an earlier remodel to replace structural partitions supporting the second floor. Since Cox knew that a flush steel beam could do the job just as well — but invisibly — he offered to include the swap-out in the contract. It clinched the sale. For the building permit, he furnished load calculations for a 22-foot-long W8x21 I-beam, referencing prescriptive charts from the American Institute of Steel Construction.

The crew built temporary support walls on both sides of the existing beam and then cut it free of the joists **(1)**. They snapped lines to the width of the new beam, allowing a 1/8-inch tolerance to ease its installation, then used a recip saw to cut the joists and hangers free. They tore out the supporting posts at each end, and the ceiling was ready for the new beam.

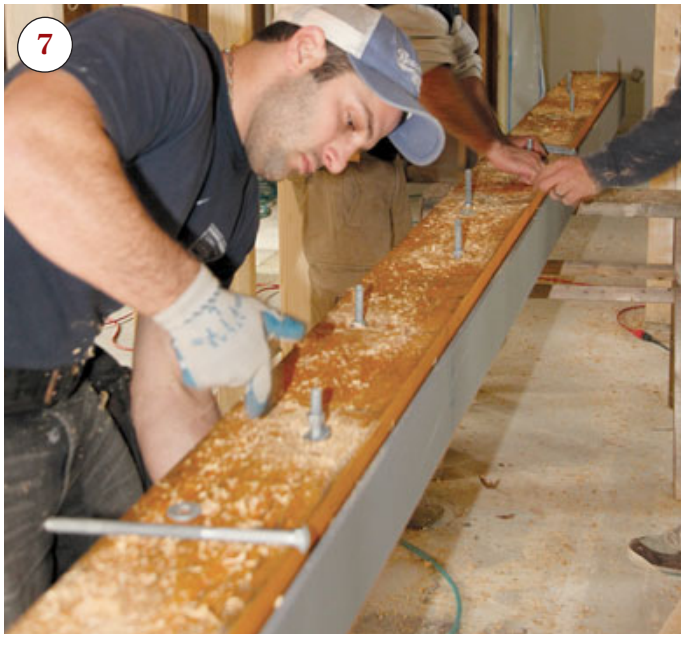
To provide a mounting surface for the joists, Cox planned to pack out the beam's web with reliably straight, stable 1 3/4-inch-by-7 1/4-inch LVL beams, with an additional layer of 2x8 framing lumber on each side to clear the edges of the I-beam's 5 1/4-inch-wide flanges. To save time on site, he ordered the beam with its web predrilled with 9/16-inch holes on 12-inch centers in a staggered high-low pattern. The holes were for the 1/2-inch carriage bolts that would attach the LVL to the steel.

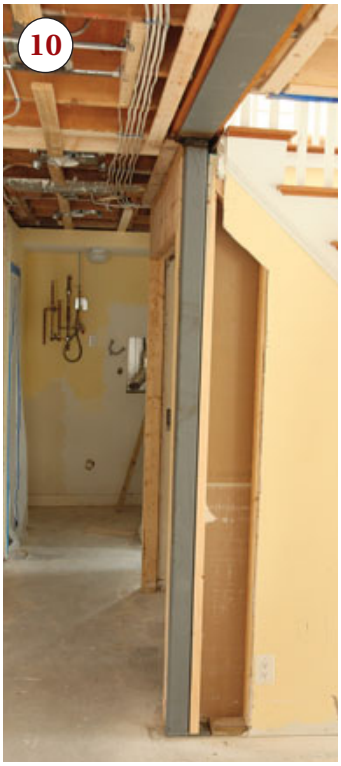
The crew hauled the 460-pound beam inside through a convenient window and set it on sawhorses beneath its eventual location in the ceiling **(2)**.

First, the crew used powder-actuated pins to fasten

the 2x8 framing lumber to one side of the web (3). The 7 1/4-inch dimension fit conveniently between the flanges without any trimming. They then nailed the LVL to the 2x8 (4), flipped the beam over, and used the holes in the web to drill through both pieces of lumber (5). They repeated the process on the other side, then flipped the beam over again and drilled the bolt holes back through the full assembly (6). To prevent possible conflicts between bolt and joist layouts, they drilled recesses for the nuts and washers using a 2-inch spade bit, then installed the bolts (7). Excess bolt length was hacked off flush with the face of the LVL.

The crew called in extra hands to raise the beam, first setting it on cleats





nailed to the walls at each end **(8).** Then, using a bottle jack, they forced it up into the slot and supported it on temporary wood posts **(9)**. Square hollow-steel posts standing on the slab foundation and welded to the beam provide permanent support **(10)**. New joist hangers completed the installation **(11)**.

Like those of lumber, steel beam dimensions are nominal, not precise. In this case, the 8-inch beam actually measured 8 1/4 inches. So, despite 1x3 furring crossing the 2x8 ceiling joists, the beam remained 1/4 inch proud of the surface **(12, 13)**. The drywall installers simply cut the drywall to the edge of the steel, covered the flange with self-adhering mesh tape, and applied quick-setting compound directly over the bottom flange. Additional mesh and joint compound created a smooth finished ceiling **(14)**. — *Dave Holbrook*