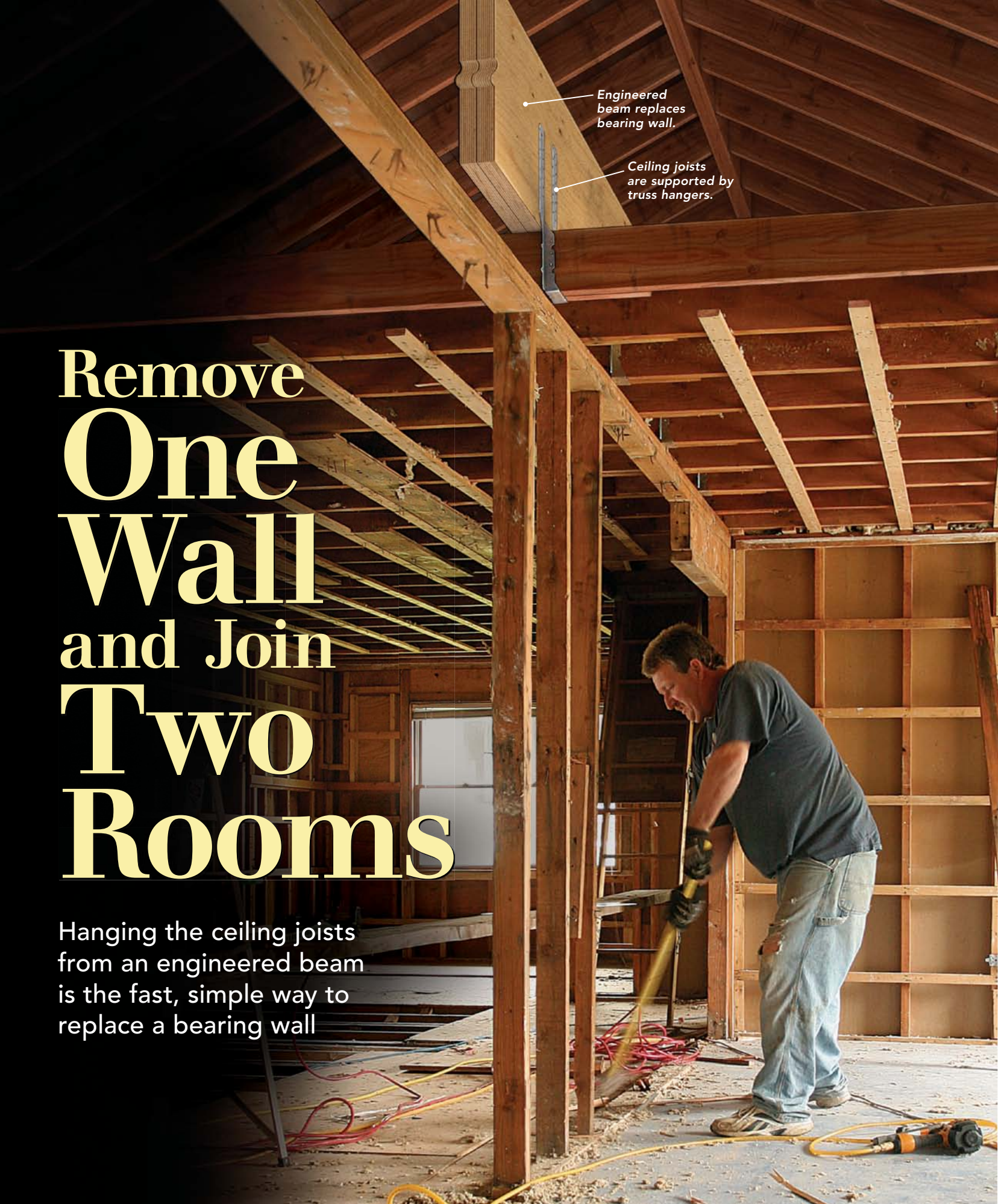
Remove One Wall and Join Two Rooms

Hanging the ceiling joists from an engineered beam is the fast, simple way to replace a bearing wall



Drawings: John Hartman

BY MIKE GUERTIN

Many of my remodeling clients want to remove a wall to create a more open floor plan by integrating the kitchen into the living and entertaining part of their home. A nonbearing wall is a cinch to remove. However, if the wall is bearing, which means that it carries ceiling or floor loads from above, removing it requires replacing it with a properly sized beam. The conventional approach is to remove part or all of the bearing wall and to support the framing with a header that sits below the ceiling plane. In this case, the owner wanted a clear, unbroken ceiling, so the beam had to be hidden above.

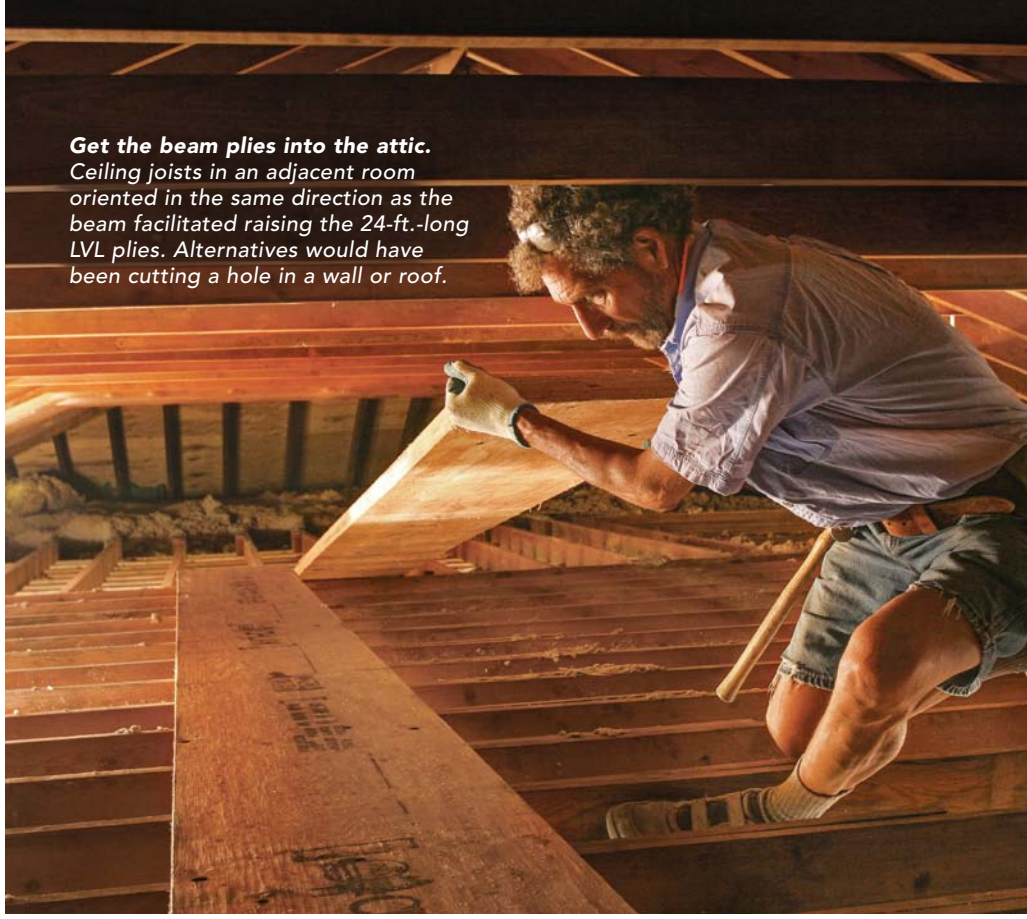
There are two ways of installing a hidden ceiling beam. One is to use a flush beam, where the ceiling joists are cut and the bottom of the beam is set flush with the bottoms of the joists. The joists are then attached to the beam with hardware. This can be a good choice, particularly when there are ducts above the joists that would be hard to relocate.

Alternatively, an attic beam can be installed above the joists, which hang from the beam with framing hardware. The attic-beam installation is much simpler than the flush-beam option. There is no need to cut joists, and there are no temporary support walls to build. A real benefit of this approach is that it's only when the beam is fully installed that the existing bearing wall is removed. This saves labor with no difference in material cost.

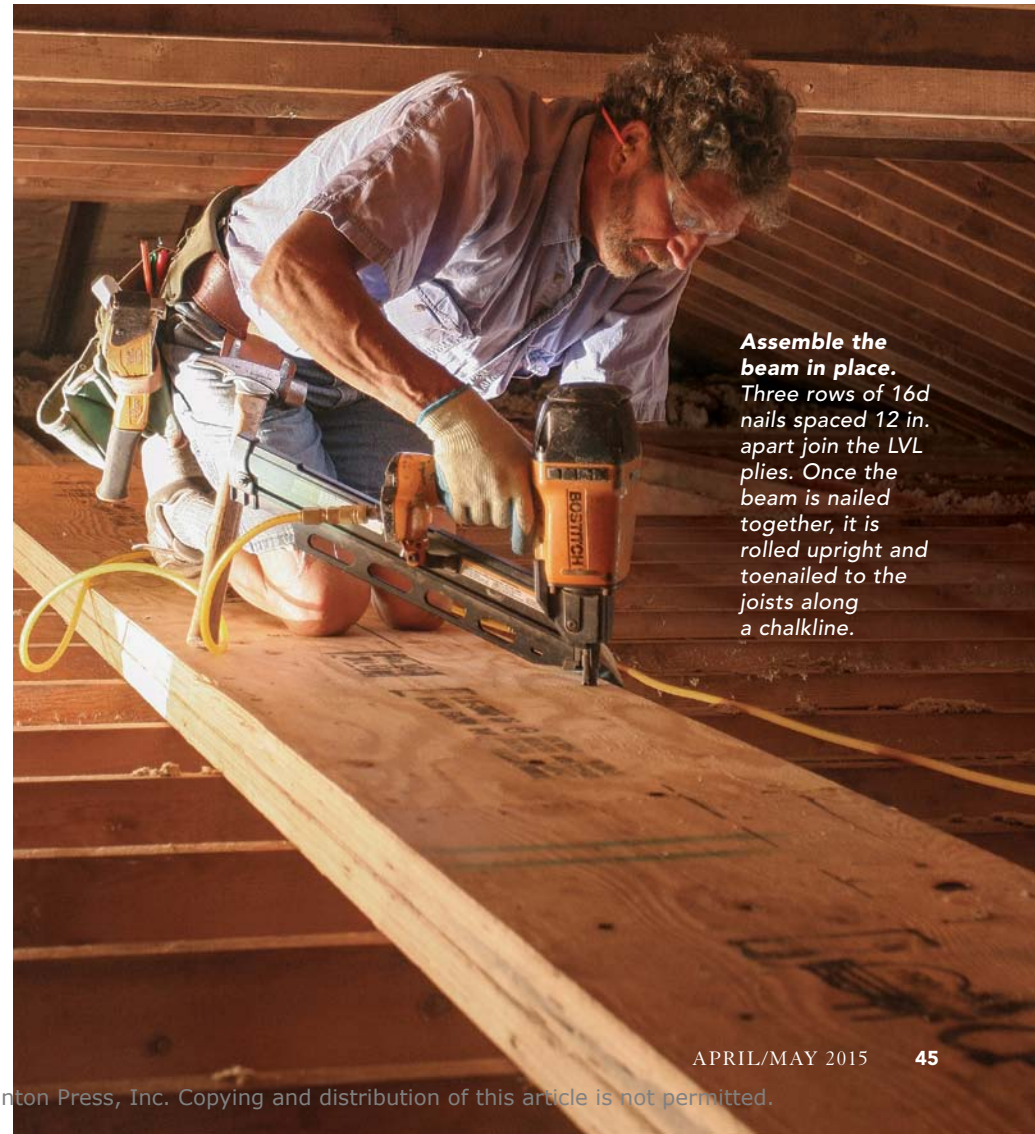
Sizing the beam

On this job, my brother and I opted for a built-up LVL beam rather than a steel or PSL beam. Because it's built from multiple plies that are joined in the attic, two workers can handle lifting each LVL into place separately. The beam is sized based on the span and the load. This beam needed to span 24 ft. and to support a ceiling 24 ft. wide. The load consists of two components: the dead load and the live load. Dead load is the weight of the ceiling framing, the drywall, and the insulation (calculated at 6 lb. per sq. ft.). The live load is the weight of people and things. That number comes from the IRC, which requires attic floors to be able to support 20 lb. per sq. ft.

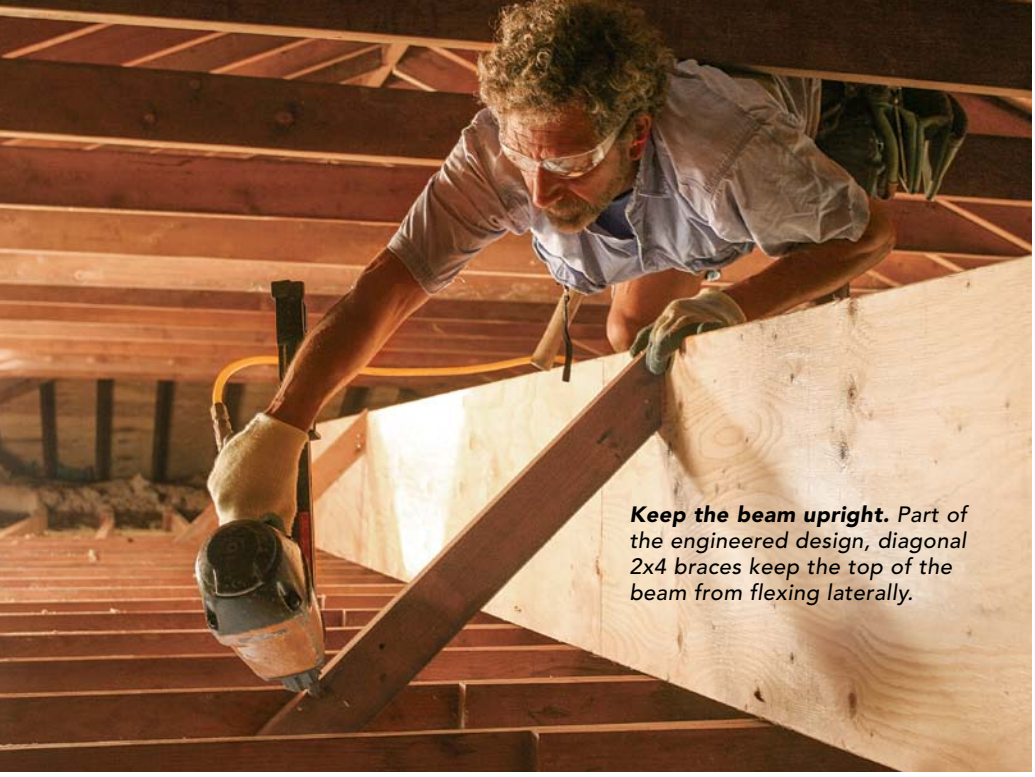
Knowing that the local building official would require it, we had an engineer design the beam (some LVL suppliers provide this service). The engineer gave us a choice of either a double 18-in.-deep LVL or a triple



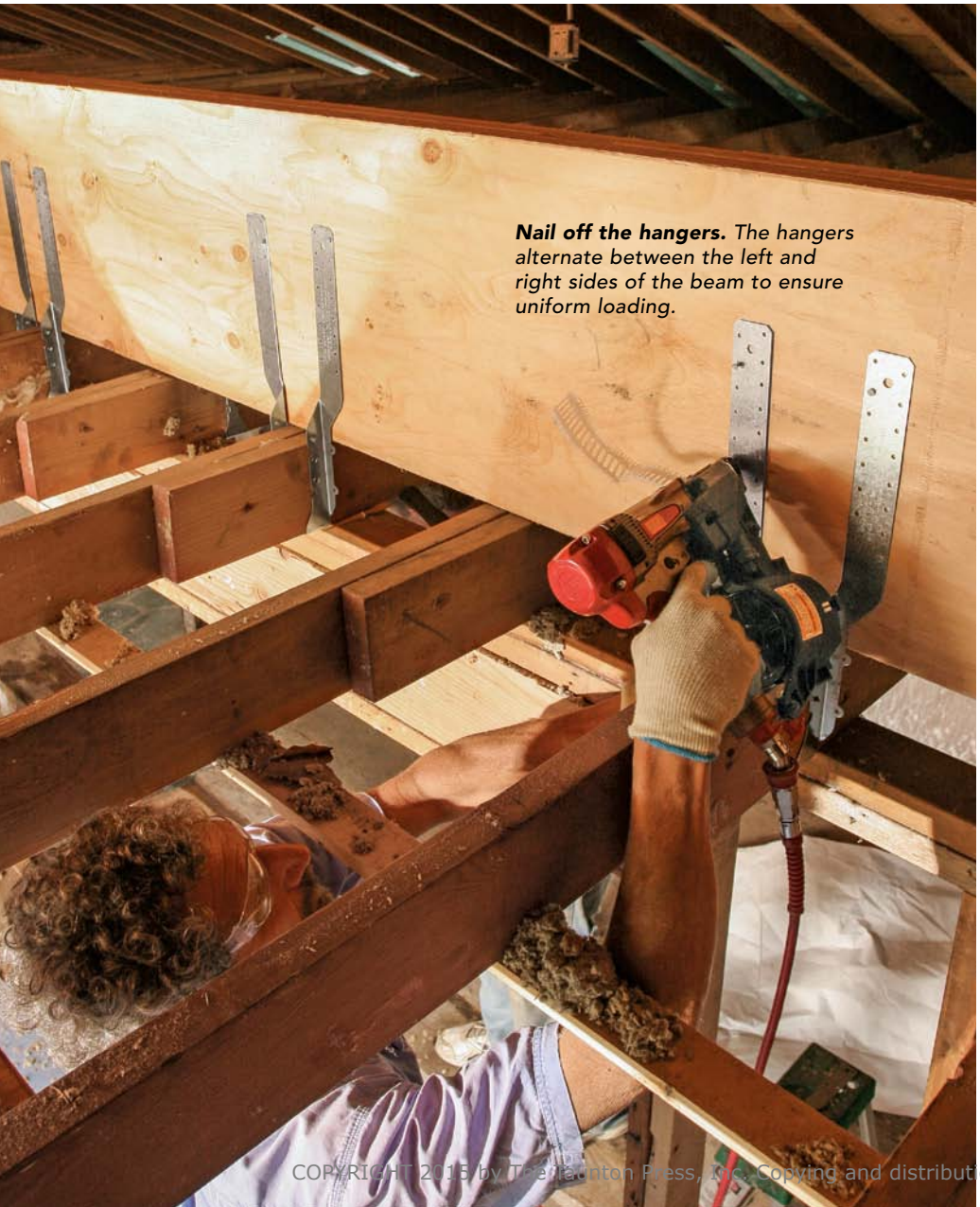
Get the beam plies into the attic. *Ceiling joists in an adjacent room oriented in the same direction as the beam facilitated raising the 24-ft.-long LVL plies. Alternatives would have been cutting a hole in a wall or roof.*



Assemble the beam in place. *Three rows of 16d nails spaced 12 in. apart join the LVL plies. Once the beam is nailed together, it is rolled upright and toenailed to the joists along a chalkline.*



Keep the beam upright. *Part of the engineered design, diagonal 2x4 braces keep the top of the beam from flexing laterally.*



Nail off the hangers. *The hangers alternate between the left and right sides of the beam to ensure uniform loading.*

16-in.-deep LVL. Without a height issue in the attic, we opted for the more economical double 18-in. LVL. The engineer also specified adjustable truss hangers for attaching the joists to the beam, and both Simpson Strong-Tie and USP Structural Connectors make them. Truss hangers are like joist hangers with extralong straps. The hanger bottoms cradle the ceiling joists, and the straps nail into the beam.

Inserting the beam

We located the beam directly above the existing bearing wall that would be torn out. We marked the edge of the wall at the top of the ceiling joists at each end and snapped a chalkline to guide beam alignment. We had removed most of the drywall in the house, so we were able to slip the beam plies through the ceiling into the attic. One guy pushed the beam plies up one at a time while the other pulled from inside the attic. Once the LVLs were in the attic, we nailed them together and rolled the assembled beam upright.

The beam had to be braced at the bottom and top to keep it upright and to prevent deformation from the load. We installed diagonal 2x4 braces on both sides of the beam at the ends and at two locations, about 8 ft. apart, along the middle. The bottoms of the braces were nailed to the sides of the ceiling joists. The bottom of the beam was also braced with 2x blocks nailed to the top of the ceiling joists beneath the diagonal bracing.

Blocking transfers the loads

Before the bearing wall was removed, we installed squash blocks (short studs) between the beam ends and the top plates. We placed extra studs in the walls below the beam to carry the load through the wall and down to the foundation. We then inserted more squash blocks between the basement beam and the underside of the subfloor sheathing below the studs at one end, and between the mudsill and the subfloor at the other end. Only then did we remove the old wall.

The whole process—sliding the beam in place, installing hardware and bracing, and removing the old wall—took two of us less than three hours. This was far faster than installing a flush beam and resulted in an assembly that's just as sturdy. □

Editorial adviser Mike Guertin is a remodeling contractor in East Greenwich, R.I. Photos by Andy Engel.

LOAD PATH

Beams impose concentrated loads that need to be transferred through the framing to the footings. In this case, there is a wall corner beneath one end of the new beam and a perpendicular wall at the other. New studs create a continuous load path at each end. One end lands on the basement beam, where it is supported almost directly below by a column. At the opposite end of the new beam, the load is carried to the foundation wall by the rim joist and a squash block. In other cases, different solutions, including new footings, might be required.