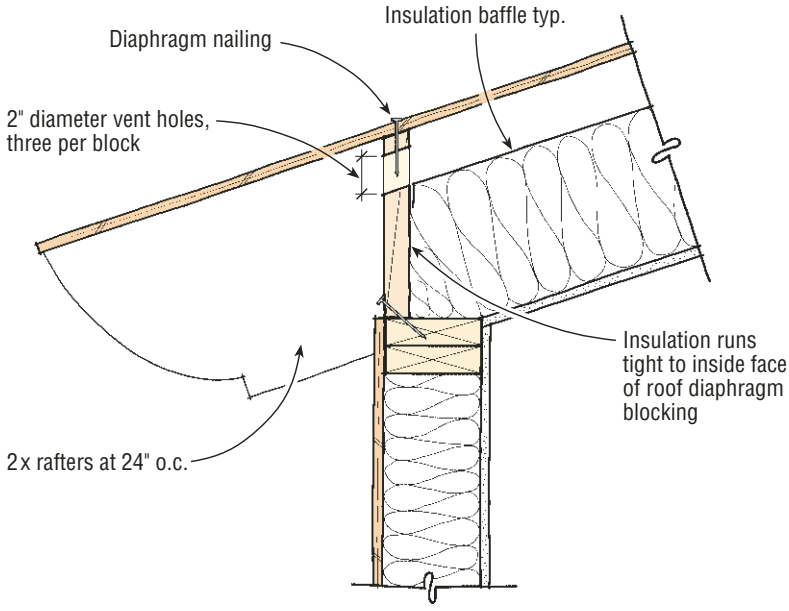
Q&A

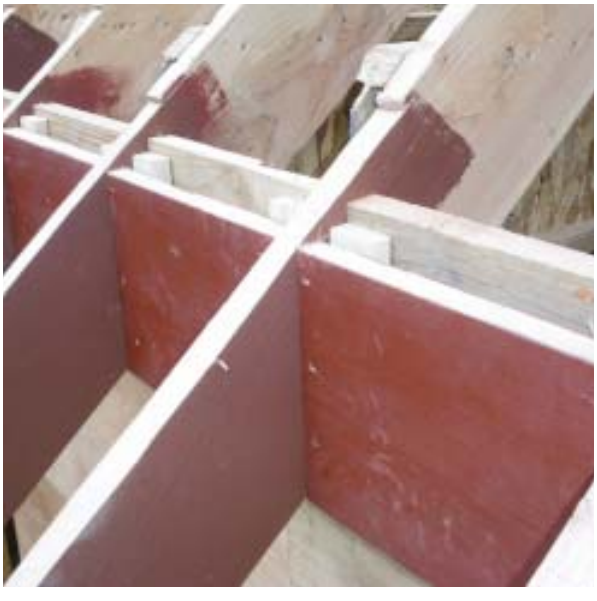
Ventilation vs. Eaves Blocking in Seismic Zones

Q. *I have a question about the hidden soffit vent details you've published recently (*Backfill, *7/04;* Letters, *10/04). Is it possible to build this so that you get a positive transfer of lateral loads from the roof sheathing to the frieze blocking and into the top plate? This is required by building officials here on the West Coast. Also, do standard eaves blocks with vent holes provide proper shear transfer?*



A. *Scott McVicker, S.E., of McVicker Associates, Inc., Structural Engineers in Half Moon Bay, Calif., responds:* Let's look at the second condition first (see illustration, right): The vent holes in the diaphragm blocking are positioned at the top of the blocks, so they clear the insulation. As far as strength goes, the 2-inch-diameter holes will reduce the shear transfer ability of the block, but not by so much that typical diaphragm nailing will be affected.

Here's a sample calculation, assuming that the horizontal shear strength of the wood is 63 pounds per square inch, with a one-third increase allowed for dynamic (seismic or wind) loading. If the 2-by rafters are spaced 24 inches on-center, the blocks are 22 1/2 inches long. Assume that for venting you need three 2-inch-diameter holes spaced equally along the block. The remaining area of wood between the holes will be 16.5 inches in length (22.5 – 6). With 2-by blocking, that gives 24.75 square inches of shear area (16.5)(1.5). The maximum force to be resisted by each block will be the remaining area times the allowable stress: (24.75)(63)(1.33) = 2,073 pounds total, or 1,036 pounds per foot, which is off the chart for typical diaphragm nailing, so no problem there.



Now let's look at the hidden vent detail featured in *JLC* (photo, left). Assume that we're using sawn lumber at 19 percent moisture content, which will shrink following construction. The outermost block in the photo will receive the diaphragm nailing. (Its top should have been beveled to match the slope of the roof; otherwise, the diaphragm nails will be subject to bending where they cross the gap.) I note that these blocks are toenailed into the rafters, which is okay so far.

Now look at my detail ("Hidden Vent-Screen Detail," next page). The shear is transferred from the exterior block to the vertical spacer blocks — but at the bottom only. (If the exterior block were nailed to the vertical block along its full height, it would fracture as it dried and shrank.) The vertical spacer blocks, in turn, are nailed to the interior block,

which is attached to the top plate using a metal clip. There you have it: The shear transfer path is complete.

This detail has a couple of possible limitations. First, as the photo shows, the contractor assumes that when the rafters and blocking shrink, they will not shrink beyond the 1/2-inch gap provided between the top of the vertical spacer block and the bottom of the sheathing. Time will tell: Bumps at the edge of the roof would be a sign that more space should have been provided.

Second, there is a practical limit on the number of nails one can use before the individual pieces tend to split. I could see four 10ds at each end of the exterior block and four 10ds from the vertical block to the interior block. Assuming 90 pounds per nail, the maximum lateral load would be: (8)(90 lb./nail)(1.33) = 957.6 lb. per 2-foot rafter spacing, or 478 lb./ft. This is certainly not in the same league as the blocks with drilled holes, but is probably sufficient for low shear conditions.

Demo Near Post-Tension Cables

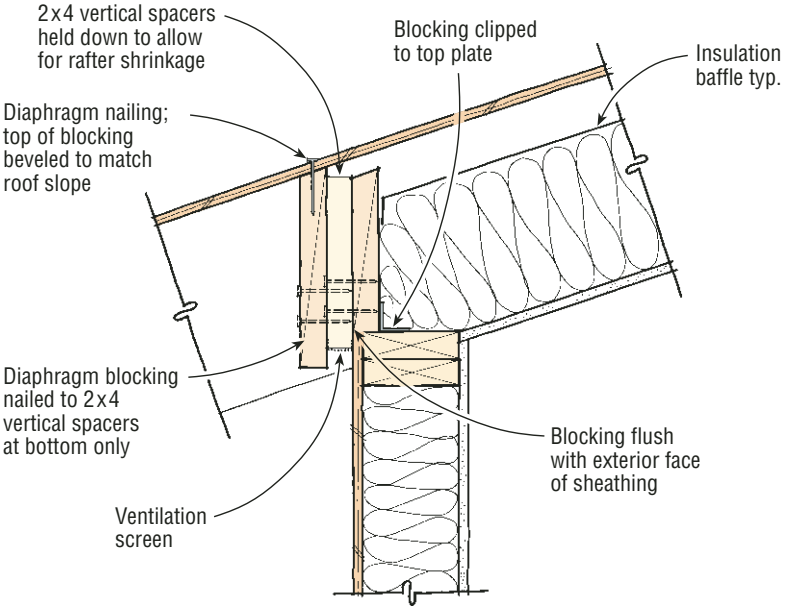
Q. *What precautions should you take when tearing out a post-tensioned slab? What are the risks? We are pouring a large post-tensioned slab, and while there is no demo involved at this stage, I would like to know how to proceed in case there is a plumbing mistake that requires us to cut out and repour a section of the slab.*

A. *Bob Kovacs, president of Constructive Solutions in Iselin, N.J., and moderator of the estimating forum at jlconline.com, responds:* I installed dozens of post-tensioned slabs in homes in Las Vegas, and just recently finished a 10,000-cubic-yard post-tensioned parking garage. The cables are tensioned to approximately 30,000 pounds, and if you cut one the wrong way, the force can easily kill you. I've seen cut cables rip out of slabs on several occasions. One ripped open a 10-foot-long strip of slab and sliced through a shear wall. Another slammed into a dishwasher 5 feet from the hole and sliced it in half. In both cases, the geniuses who caused the damage were lucky enough to avoid harm.

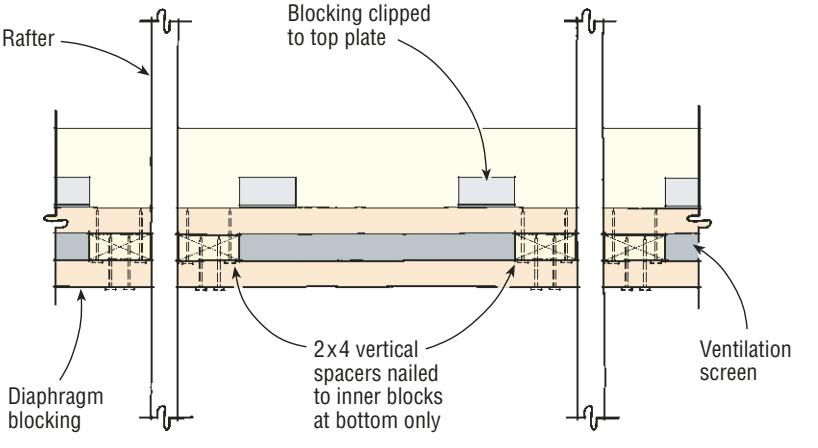
In most cases, the cables can be destressed by a post-tension contractor. It's not an easy task, especially if the location of the cables isn't easy to establish, but it's the only way to proceed unless you plan to do all the demo from the cab of a very large excavator with a hydraulic hammer and can keep everyone far from the area. I wouldn't recommend that avenue, though.

Here's what I'd do in your case: Just before the pour, take photos of every slab penetration that could possibly be in the wrong location, marking dimensions to the nearest cable in each direction. Note this information on a

Hidden Vent-Screen Detail



Top View



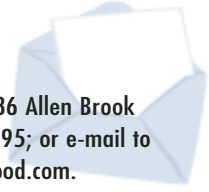
drawing as backup in case the pictures aren't clear.

Also, spray-paint the location of the "dead" ends of the cables on the formwork. (These are the ends that, rather than running all the way to the slab edge, get embedded in the middle of the slab.) Transfer these marks to the slab before stripping the forms, so you'll be able to locate the dead ends if you need to. Mark the "live" end locations on the top of the slab before cutting the cables and patching the holes. Assuming the cables run relatively straight, this will allow you to "connect the dots" and roughly locate a cable in the slab.

We did this recently on the post-tensioned garage slab, spraying paint along the cables on the deck forms; it really helped when we had to recore a few plumbing penetrations.

Snap out all your walls before tensioning the cables, and determine what, if anything, needs to be moved. Jack up the slab now and make the moves so that you don't hit any stressed cables: Repairing an unstressed cable is far easier than repairing a stressed one. Usually you end up waiting at least a week or so after the pour to tension, so this shouldn't be a big deal.

If it's not going to cause a tripping hazard, leave the ends of the tendons hanging out for a while so that you can destress a cable later if you have to. Unfortunately, it's not usually possible to leave cables hanging, because everyone ends up tripping on them, and complains about getting grease on their pants from walking near them.



Got a question?

Send it to Q&A, *JLC*, 186 Allen Brook Lane, Williston, VT 05495; or e-mail to jlc-editorial@hanleywood.com.