Q&A

Strengthening Garage Door Walls

Q. *Can anyone explain the actual technical concern and reason that new building codes are requiring specific structural improvements on garage door "lug walls" (the short walls next to the garage door opening)?*

A. *Bryan Readling, P.E., responds:* Studies have shown that walls containing garage doors perform poorly when subjected to lateral wind and seismic forces. This is especially true when the wall containing the garage door is offset by more than a few feet from other braced wall lines parallel to the garage door (see illustration, below).

In that case, the open-ended side of the garage enclosure is not braced well by the remainder of the home, and the often narrow walls on either side of the door are subjected to relatively large lateral and uplift forces collected within the garage portion of the structure.

Making matters worse, garage doors themselves are vulnerable to failure from relatively minor windstorms due to wind pressure and flying debris. When a garage door is breached, the resulting pressure on the interior walls of the garage can add dramatically to the lateral and uplift forces already present in this vulnerable area. Since few structural redundancies generally exist in the garage area, failures tend to be catastrophic in nature.

The *International Residential Code* requires "braced wall panels" at the corners and at regular intervals (typically every 25 feet), as well as bracing of the wall line at a certain minimum percentage. Most of the wall-bracing options listed in the *IRC* are not possible at narrow garage return walls since the required minimum braced-wall length is typically 48 inches. Anything less than 48 inches is generally too flexible and weak.

An exception in the code states that when "continuous structural panel sheathing" is used, the width of wall segments considered as "braced" can be reduced from 48 inches to as little as 24 inches depending on the height of openings adjacent to the segment (*IRC*, R602.10.5). For garage return walls, a 24-inch width is allowed if there is no story or bonus room above.

"Continuous structural panel sheathing" means that all exterior wall surfaces (and in some cases interior braced wall lines) are sheathed entirely with plywood or OSB wall sheathing, including the portions of walls above and below window and door openings. This change, introduced to the *IRC* by the National Association of Home Builders, is based on extensive full-scale testing showing this type of construction to be inherently stronger and more

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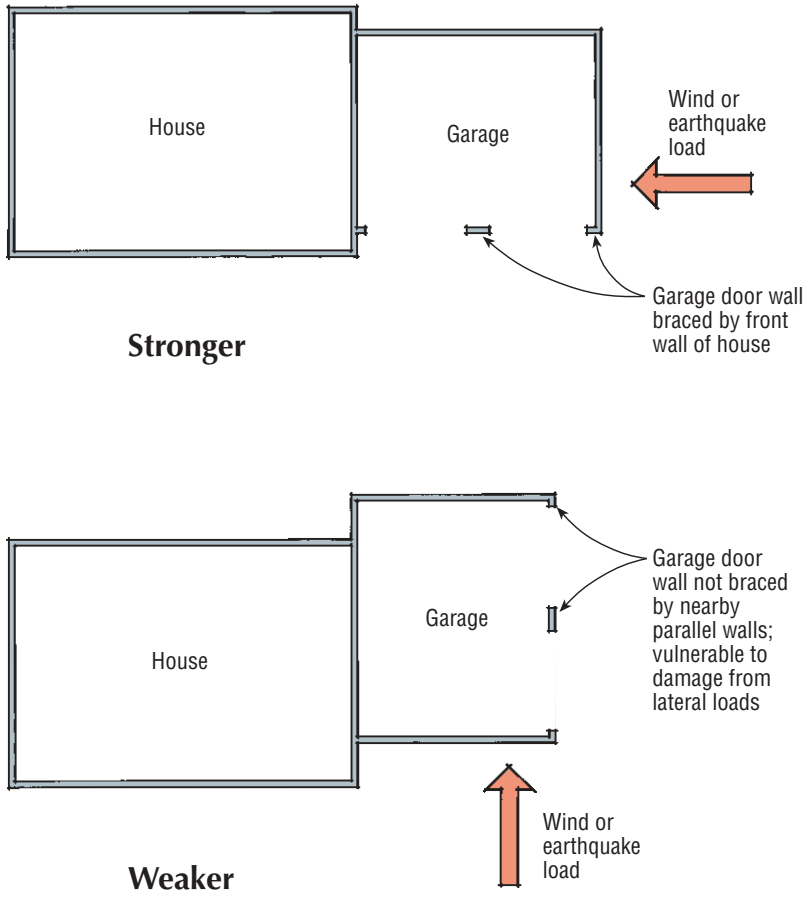

redundant than walls with structural sheathing only at the corners and at regular intervals.

But what about popular designs with a bonus room or second story above the garage? For that scenario, a site-built solution known as the Narrow Wall Bracing Method, developed by APA – The Engineered Wood Association, can be used to provide a braced wall as narrow as 16 inches. This approach builds additional strength into the framing around the garage opening by creating a rigid connection that resists rotation between the garage return walls and the garage door header. This is achieved by extending the header beyond the rough opening (almost to the corner) and lapping the wall sheathing over both the wall studs and the header.

Besides more nails, additional details include more robust 2x2x3/16-inch plate washers on the anchor bolts, three-stud corner framing, and a 1,000-pound strap connecting the back of the wall studs to the header. With this relatively inexpensive site-built method, outlined in APA publication D420, side walls can be reduced to as little as 16 inches in width, even with a bonus room above. The Narrow Wall Bracing Method is now being proposed for inclusion in future versions of the *IRC* and has already been adopted for use in some states and local jurisdictions. It is available for free download at www.apawood.org/bracing. For a description of how to build and detail the narrow walls, see the article in this issue of *JLC*.

Bryan Readling, P.E., *is a structural engineer with APA's Field Services Division in Davidson, N.C., specializing in wind damage and the use of engineered wood products and building structures to resist hurricanes and tornados.*

Painting Fiber-Cement Siding

Q. *Fiber-cement siding comes primed. Can I go straight to a top coat? What's the best paint to use?*

A. *Duffy Hoffman responds:* There are a couple of potential problems with the primer that comes on fiber-cement board. First, it's probably been thinned to make it easier to spray, which dilutes both the primer and the mildewcide in it. Also, you don't know how long ago the material was primed. Primer only holds its tooth for 30 to 60 days; after that, the surface should be reprepped.

Unless you have reliable information about when and how the material was primed, I would err on the side of caution. A good substrate ensures a good top coat. If the substrate fails, so will the top coat. Even if you could get the siding manufacturer to cover the cost of the paint, it wouldn't cover your labor cost to scrape, sand, and recoat. Because fiber cement is a hazardous material to sand, to me it makes more sense to prep the substrate correctly in the first place. Here's what I would do.

First, wash the siding with Pittsburgh Paint's MildewCheck. This is better than using a bleach solution, which dissipates within about 48 hours, allowing mildew spores to once again begin growing. MildewCheck leaves a longer-lasting film of mildewcide on the surface. Next, I would lightly etch the surface with 150- to 320-grit sandpaper, then prime with a good acrylic primer, followed with a 100% acrylic top coat.

Duffy Hoffman *is a painting contractor and restoration consultant in Pipersville, Pa.*

New Slab Over Old?

Q. *I am renovating a barn where the existing concrete floor slopes approximately 6 inches in 30 feet. The architect wants me to build a level floor using wood sleepers with foam insulation in between, then pour a minimum 1 1/2-inch-thick radiant slab between the sleepers. The finish floor will be slate. Instead, I recommended pouring a new level slab over the existing slab and installing the radiant tubing in the new slab. The homeowners are worried that the cracks in the old concrete will cause the new slab to crack. Would an isolation membrane stop that from happening? What would the minimum thickness of the new slab have to be?*

A. *Michael Byrne responds:* Renovating a barn slab is riskier than farming. A host of unseen problems, from poor drainage to inadequate reinforcing, could seriously affect the life of the slab you pour on top. It would be bad enough if the topping pour were close to level, but the wedge you are planning is bound to be problematic.

Whenever the substrate and subsoils are in doubt, as they are in your case, no isolation membrane will protect the tiles or the radiant heat system. Tapered pours are notorious for cracking because concrete and mortar have greatest strength when their cross-sections are uniformly thick. Also, it will be difficult to secure the hydronic tubing in a level plane, to ensure even heat dispersal, over the old out-of-level slab.

Your best bet is to remove the old slab, prep the substrate, then pour a new 4-inch radiant slab over 1 1/2-inch rigid foam board.

Contributing editor ***Michael Byrne*** *is an expert tilesetter and consultant in Los Olivos, Calif., as well as author of many* JLC *articles and the book* Setting Tile.