Q&A

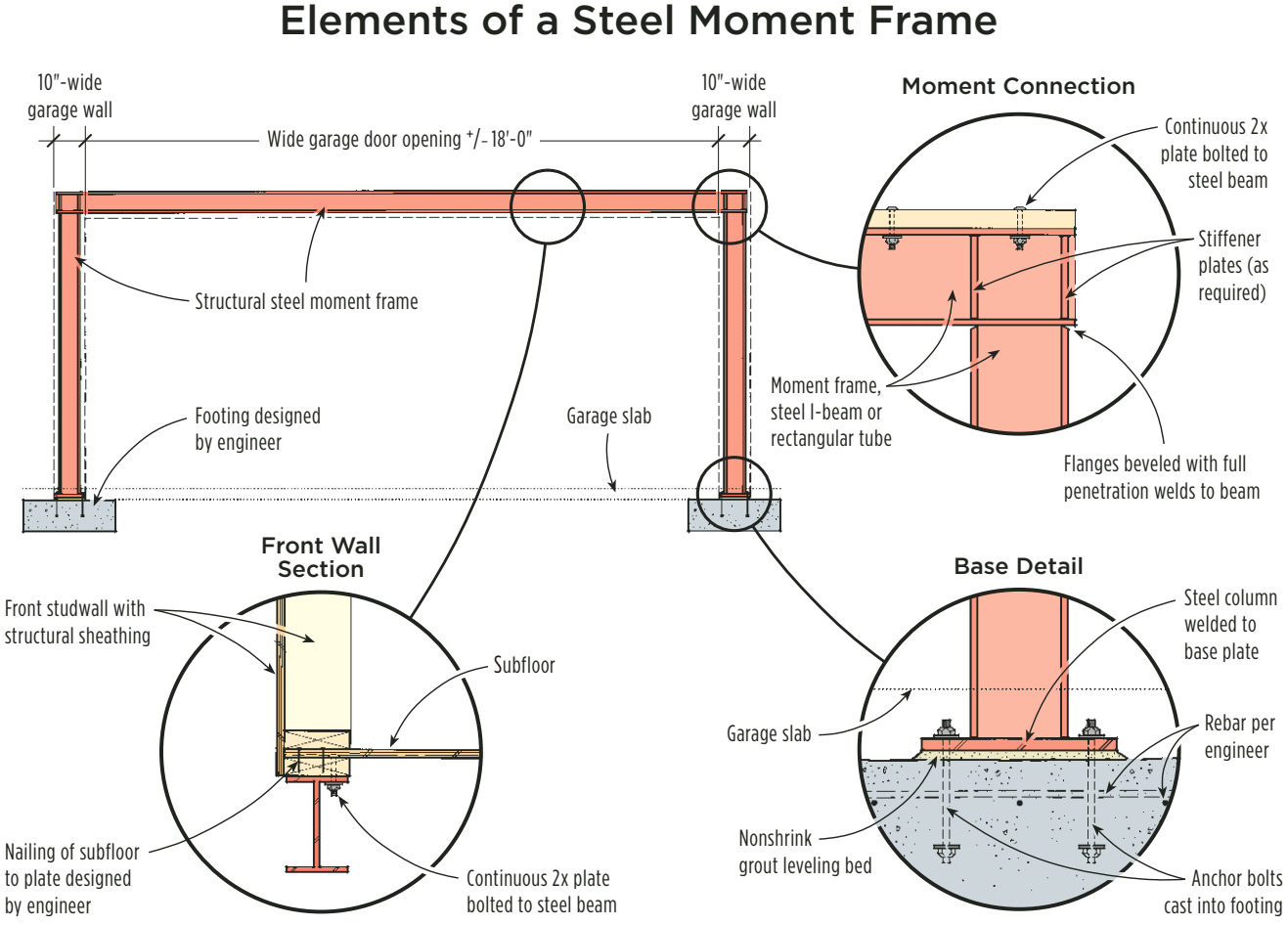
Q. Narrow Shear-Wall Solution

I'm the project manager for a construction company that's building a series of townhouses. In one of our designs, the garage walls are only 10 inches wide. There isn't any room to expand these walls, but they still need to be reinforced to prevent racking. Is there a prefabricated shear panel we can fit into a 10-inch-wide framed wall to solve our problem, or do we need to find an engineered solution?

A. *Christopher DeBlois, a structural engineer with Palmer Engineering in Tucker, Ga., responds:* This is a problem frequently encountered in townhouse construction, with the fundamental difficulty arising from the fact that townhouses must be designed structurally as if each unit were a completely separate building.

Fire separation can't be compromised, so there can be no positive structural connection between units. Add to that the standard architectural desire for narrow, deep units with lots of glass on the front and rear walls and big garage-door openings at the lowest level in front or back, and you have a recipe for serious structural trouble.

There are a number of tools available to resolve racking problems. In addition to standard



A moment frame can be used to provide shear strength for narrow-walled structures when standard framing solutions are inadequate. In all cases, beam and column sizes and connection details need to be designed by a structural engineer.

shear walls with exterior plywood or OSB sheathing, we can use interior shear walls (almost always needed in the long direction of each unit, often detailed for the rear wall of garages); double-sided shear walls (not a favorite among plumbers, electricians, and hvac crews); proprietary narrow shear-wall systems, such as Simpson Strong-Walls; and moment frames of steel or reinforced concrete.

But this is not an issue for a project manager, a framer, or even an architect; this is one of those instances where a structural engineer should be consulted, preferably early in the design phase of the project.

As far as I know, there aren't any prefabricated shear panels that will work with a 10-inch wall; the narrowest one I'm aware of is 12 inches wide.

What you'll need is a structural-steel moment frame with steel I- or rectangular tube columns that can fit in the 10-inch space on either side of the garage-door openings, as well as a steel beam across the top of the garage door between the two columns. Special rigid connections — called "moment connections" — should be used to connect the beam to the columns.

To provide adequate anchorage to the foundation, given the limited space available, you may need special details at the column bases. Also, the connections from the front framed wall above to the steel beam will require special attention to ensure that wind and seismic lateral forces from the upper portion of the building can be properly transferred to the moment frame (see illustration, previous page).

Early collaboration between architect and engineer to establish key firewall details and identify opportunities for lateral bracing can head off these kinds of structural problems. If the architect is relatively flexible early on, an engineer can ensure that the building is not.

But if — as in this case — the problem must be solved after the plans are set (or worse, after construction is well under way), the solution is likely to be complex and expensive.

Q. A Use for Recycled Concrete

One of the contractors I'm interviewing to install a driveway surfaced with interlocking concrete pavers has suggested using recycled concrete rather than processed stone as a base material. He claims he's used it already on several driveways and that it has held up well, but I'm not very familiar with this material. Is this a good or a bad idea?

A. *Bill Palmer, editor of* Concrete Construction *magazine, responds:* Recycled concrete has been used extensively as aggregate in highway work around the country. A recent study by the Federal Highway Administration's Pavement Recycling Team looked at the use of recycled concrete aggregate (RCA) in five states; all five reported that RCA used as a base material performs as well as or better than virgin material.

As an added bonus, using RCA as a base keeps it out of landfills. The Texas Department of Transportation recycles nearly 100 percent of its concrete rubble. In the Denver area, about 6 million tons of concrete from the old Stapleton Airport runways has been recycled for various purposes.

Recycled concrete has been used in many areas as aggregate in making new concrete, although there have been problems with the workability of the mix. Generally, these have been overcome by making sure the RCA has consistent moisture content when it goes into the mix.

When used as a base material, RCA should be placed wet — nearly saturated — and compacted with a steel roller. But this could create a problem if it's being used underneath pavers, because RCA can contain some unhydrated portland cement.

Interlocking pavers need a base that allows drainage; if there is free cementitious material in the RCA, it could set into a low-strength mass that doesn't drain well. The likelihood of this problem occurring depends on the source of the recycled concrete, which typically is produced by state DOTs or by specialized companies doing big jobs like runways or roadways.

Thus, the RCA should be tested prior to use.

Q&A

Q. Do Door Jambs Need Shims?

When I install prehung and precased doors, I use shims to plumb both the hinge and strike jambs before nailing off the casing. But I've been on jobs where the carpenters plumb the hinge side of the door and then nail the prehung casing solid to the studs without using shims. This method certainly seems faster, but is this kind of installation strong enough, and does it allow enough room for expansion?

A. *Gary Katz, a finish carpenter in Reseda, Calif.; moderator of* JLC *Online's finish-carpentry forum; and a frequent contributor to* JLC, *responds:* I've installed thousands of hollow-core prehung doors in apartments, condominiums, and housing tracts — all without shims.

If the rough openings are sized 2 inches larger than the net door size, and if the door frame is roughly centered in the opening, the remaining gaps between the jambs and the framing are only 1/4 inch to 3/8 inch wide. Four 2 1/2-inch-long nails through the jamb at each hinge — a pair above and a pair below — and pairs of nails through the strike jamb about 14 inches on-center into the trimmers or jack studs, along with 2 1/2-inch nails through the casing into the studwalls, are more than enough to secure a hollow-core prehung door. A single 2 1/2-inch-long drywall screw through the top hinge and into the trimmer seals the deal.

The purpose of not using shims is for speed, though, not expansion. On the jobs I worked, I wasn't being paid for care, but for completion. Still, we never had callbacks and those doors still work fine.

However, if you're installing a solid-core door, whether it's prehung or not, always use shims. And for hollow-core doors in custom homes, shims are a good idea, too — who knows when someone will decide to switch out those lightweight doors for heavier ones.

On a standard 6'-8" door, I like to shim just beneath each hinge, and I put three sets on the strike side: one near the top of the door, one behind the strike, and one near the bottom. And on every door, I install long screws through the top hinges that sink securely into the trimmer.

Those screws do more to secure a door than any stack of shims or any number of nails.

Q. Bending Copper Pipe

On a recent job, a plumber who was soldering up 1/2-inch Type L copper supplies encountered an I-joist. So that he wouldn't have to cut into it, he used a pipe bender to give the pipes a slight 3- to 5-degree bend. Is this okay, or would it be better to use soldered fittings?

A. *Kenny Hart, a master plumber and certified home inspector in Hampton Roads, Va., responds:* While I would not recommend bending rigid pipe unless it is annealed (heated) first, offsets made with a pipe bender are pretty common when using Type L annealed copper tubing (sometimes referred to as soft tubing).

A pipe offset without the use of soldered fittings might actually be less likely to leak than one with fittings, because it has fewer joints.

And in this case, it sounds like your plumber considered both structural and plumbing issues as he did his work — always a good thing.