

DEMOLITION WITH CARE

DISMANTLE BUILDINGS CAREFULLY TO SAVE HEADACHES LATER ON

The Farrell Company is a father-and-son remodeling and restoration team that has been in business for thirty years. The company serves some of the pricier communities in the San Francisco Bay Area, and grosses \$1.1 to \$1.2 million a year. Ten to 20 percent of this figure is for demolition. Because demolition is such a significant part of remodeling, The Journal of Light Construction asked son Steve Farrell how the company goes about this time-consuming, but vital, part of the business.

Preparing For The Job

JLC: How do you prepare customers for the disruption a major demolition brings?

Farrell: During a preconstruction meeting, I educate clients about what will happen and I try to paint a worst-case scenario. I warn them that they are likely to panic a little when they see their house coming down.

On small projects, we're more likely to arrange for the client to remain in the house. If need be, they can survive with a bedroom and bathroom only, along with a hot plate and microwave. But we tell the homeowner that it's going to be dusty and unsafe, and we warn them about long periods of time without gas, water, and electricity.

On large projects, it's easiest if the occupants find another place to live for a few months.

JLC: How much do you spell out in your contract, and how much do you communicate verbally?

Farrell: We have a specification sheet in our contract that says what rooms will be demoed and what we are and are not responsible for. We



Michael Rosenfield

give a room-by-room breakdown. For example, we say a kitchen or bath will be demoed down to the subfloor or stud walls.

One clause says that if we find conditions that are not up to code, or extensive wood decay or termite damage, we will repair at our cost, but as an extra. Similarly, I have a clause in my contract that spells out the procedure in case we find asbestos.

We don't have clauses that specifically deny responsibility for things going wrong, because clients don't want to see a lot of disclaimers in the contract. Instead, I try to limit our potential liability by limiting the scope of our work.

For example, I specify that breakables and valuables must be removed. If I let an item remain, I become responsible for it. Pets are also a concern. We'll build a shelter for pets, but we won't be responsible for taking care of them.

JLC: What steps do you take to ensure building security?

Farrell: That depends on the size of the job. If we're demolishing a room or section of a house, we just plywood the doorway or hallway entrance. For large demos we rent a fence with barbed wire across the top and one or two gates. A cyclone fence will run \$800 for a year. That's minimal compared to our liability for building security or a backyard pool.

To protect valuables, we encourage clients to rent a large bin that will remain at the job site. They come in various sizes and configurations, such as half office, half storage.

If we use part of the bin for tool storage or office space, we'll split the cost.

Of course, bins are ugly, so we ask the clients to make sure their neighbors don't mind. Also, in some towns they need permits.

JLC: What types of barriers do you use to keep dust and debris out of the rest of the building?

Farrell: We put up a double layer of 6-mil poly over openings, and we plywood over that.

Sometimes we have to go in and out of an opening, so we'll frame it into a temporary door. We'll use an old door or make one from 1 1/8-inch plywood. Stapling scrap carpet around the stop helps keep down dust, but no matter how you block off an area, you can't entirely avoid the dust.

JLC: How do you supervise the demo subs?

Farrell: I always have at least two journeymen carpenters on large projects to point out structural parts of the house that we don't want removed or that could be dangerous if removed improperly. Also, we don't want to make work for ourselves, such as having to replace a gas line or a wall that should have remained in the first place.

A carpenter knows how to take things down in the reverse order that they went in. The risk element goes way down with good carpenters on the job.

Bidding

JLC: How do you avoid surprises when you bid a job?

Farrell: During the bidding stage, my dad and I walk through the house and go over the job with a fine-toothed comb. We use both written and mental checklists. We look at the condition of the water heater, furnace, roof, and masonry. We identify plumbing chases, the main vent stack, antiquated wiring, and the way the joists run.

If I'm skeptical about something I see, I bring in the appropriate sub. For example, I may want to double-check that the sub figured on moving an electrical meter.

Asbestos is another big issue — especially with plaster and acoustic ceilings. On a pre-demo walkthrough, we'll note what we think is asbestos and get samples tested. If I find a problem, I stop the job and call an asbestos removal contractor. It's not worth fooling with and the fine for improper removal is substantial.

JLC: Do you typically cut away existing finish materials to see things when estimating?

Farrell: On preinspection we go into a crawlspace or attic, but we rarely open walls unless we see something that is really suspect.

For example, on one large demo we spotted a badly cracked head jamb over a double door. A tremendous load fell on top of the doors. So we opened up the wall and found that the header had completely snapped in half. We immediately shored up the area, then fixed it.

JLC: How do you charge for demo?

Farrell: There are a lot of variables in demo work. Are we responsible for moving everything out of the house? For security? Are we demoing a second story, where the first floor will be exposed to the weather? Do we have to move debris through a clean part of the house?

We haven't found any magic formula. We walk through the job in our minds, figuring about how long it will take us, based on past experience. Then we add a third to a half of this figure — although this is negotiable if the client balks.

This markup is to cover the unexpected — for example, if we find 12-inch-thick concrete instead of the usual 4-inch.

Structural Evaluation

JLC: How do you determine what is load bearing and what isn't?

Farrell: Once you've removed the drywall, you can see the relationship

of the wall framing from one floor to the next.

As any good builder knows, if joists split over a wall, that wall is load bearing. With framed and truss roofs, the load-bearing walls are generally beneath the eaves, though with trusses there might be a bearing wall under a web-chord intersection. The gable ends of a house with a gable roof are not usually load bearing, nor are walls that run parallel to the joists. Of course, there are always exceptions.

JLC: Any other critical points to look for?

Farrell: Yes, point loads and shear walls.

Point loads occur beneath posts or columns. Sometimes posts run straight up to the peak of the roof and support the ridge pole. Other times, they'll be embedded in a wall.

Some walls function as shear walls, an important issue in seismic and high-wind areas. These walls may have let-in braces, steel straps, or plywood. You can remove the let-in braces from shear walls during the demolition phase, but you have to replace them with metal straps or $3/8$ - to $1/2$ -inch plywood.

Make sure all load-bearing walls and point loads are supported from the foundation up. And always demo bearing walls and posts from the top of the structure down, unless you don't have a choice.

JLC: Do you ever call in an engineer or architect?

Farrell: When we discover hold-downs, ties, or major bearing walls, code officials make us call a structural engineer or the architect who drew up the plans. We also have to contact an engineer if we discover structural flaws in the building.

This has been a big headache in old homes which were not built to plan. For example, we were doing a demo recently on a house with a second-story addition. The city had signed the building permit for the previous work, but we found a serious structural flaw.

The whole ridge, with a tile roof, sat on a center bearing wall, but there was no foundation or central girder under this wall — just a grid of 4x6 girders over a tight crawlspace. The $1\frac{1}{8}$ -inch subfloor sloped to the middle of the house. I called the architect and told him there was no way to get a big beam in there. After discussing alternatives, we decided to place reinforced concrete pads, jack up the bearing wall, and support it on posts.

Mechanical Work

JLC: What kinds of electrical and plumbing problems can you anticipate?

Farrell: In demolition you always expect the unexpected. The most common plumbing problem we find is that waste lines do not slope adequately downhill. Also, electrical connections made in the wall rather

than in a junction box are quite common.

When we discover problems like these, we share the discovery with the homeowner, give them our evaluation, and our cost to fix it. Our contract explains that anything in the walls or in the direct area of the remodel will have to be brought up to code, at their expense.

JLC: Do you use mechanical subs during demo?

Farrell: I always ask the subs how they want us to handle demo. Many times they can walk us through the demo, and we'll do the mechanical work ourselves. We'll shut off the water and remove the plumbing right to the floor level. Or we can shut off the electrical panel and remove wiring. If the crew tears out too much, however, it makes the sub's job harder.

In particular, I like the electrician to be on the job while electrical is being removed so he can keep what he wants intact and can label wires.

JLC: How do you arrange for power on the site?

Farrell: If the owner is not living in the house, the electrician kills the panel and sets up plugs outside the house — one 220-volt line and four 20-amp, 110-volt lines.

If the owner is living in the house, we keep the area where they're living hot and make sure the demo crew knows where the wiring is hot.

Shoring and Bracing

JLC: What type of shoring or temporary bracing do you typically use when removing load-bearing walls?

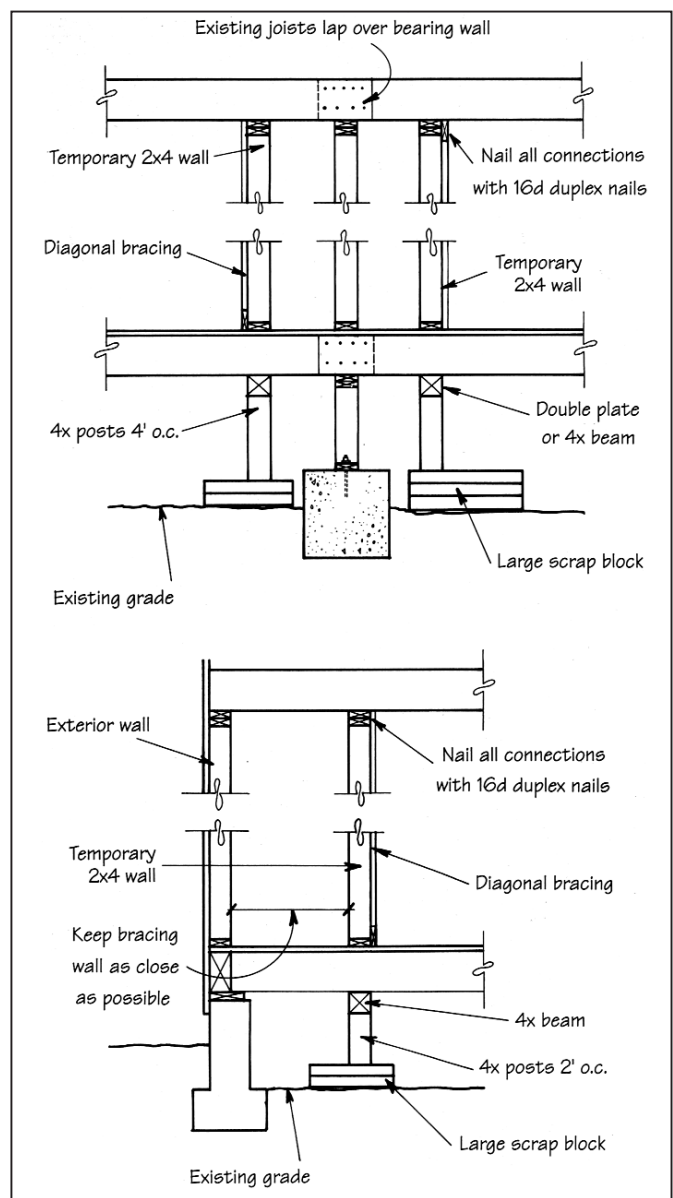
Farrell: Before we begin removing any load-bearing walls, we make sure we have the following items on hand:

- Plenty of large blocks for use as pads. We use 8x, 6x, and 4x materials 1 to 3 feet long. We save all our glulam scraps for use in shoring and bracing.
- Plenty of 2x4s and 4x4s from 8 to 20 feet long.
- Duplex nails, both 8d and 16d.
- Hydraulic and screw jacks. We use the 20-ton variety.
- Large beams of any lengths, such as 4x12s, 6x12s, 8x12s, and any glulams we have, to spread loads over large areas.

Safety is the number one concern in shoring or bracing any wall or floor. This is one time when overkill is the way to go. Whenever there's a question, we always add more shoring and bracing than the minimum that would be required.

JLC: Any helpful tips or techniques for installing bracing?

Farrell: When removing a bearing wall or beam, we start bracing at the lowest point, which is ground level, and brace up through the area to be removed. This can go up to the second or third story as long as braces line up vertically with the braces below.



When removing an interior bearing wall (top), Farrell builds temporary bracing walls on both sides, fully supported from the ground up. Large glulam scraps at grade level serve as footings for 4x4 posts, 4 feet on-center, which support a 4x4 header. The header distributes the weight from the temporary 2x4 wall above. When removing an exterior wall (above), Farrell builds a single bracing wall on the inside, as close to the exterior wall as possible.

With an interior bearing wall, we brace on both sides of the wall. We start on the ground with block pads placed 4 feet apart. Glulam scraps, which come in a variety of thicknesses, work well here. On top of these scraps, we place 4x4 posts which support a 4x4 header. The header helps distribute the load from the bracing wall above. The posts should never be more than 4 feet on-center.

For the bracing walls, we use 2x4s, 16 inches on-center. Pre-cut studs don't work; we cut each stud to length for a tight fit. We also use a double top plate or a 4x4 header. All connections, from top plate to ceiling, bottom plate to floor, etc., should be secured with 16d duplex nails. If the bracing

wall started to move, or someone accidentally fell into it, you'd want the security of the nails to hold it in place.

You also need diagonal bracing, such as a 2x4 nailed at a 45-degree angle, on walls taller than 8 feet. The diagonal member should be nailed with two 16d duplex nails at the top and bottom plate. Once the bracing is in place, the bearing wall can be taken out, and you can install a beam or repair the wall.

JLC: Does this differ for exterior walls?

Farrell: The approach is similar on an exterior wall, except that bracing is done from one side. In this case, we put posts closer together, at 2 feet on-center, in the crawlspace or basement. Try to keep the cantilever of the existing floor joists to a

minimum by placing the bracing wall as close to the exterior wall as possible.

If we're demoing a bearing wall that has a lot of braces or shear panels, we'll shear our bracing wall as well. Also, when we remove longer walls, or the whole side of a house, we go to more trouble to provide shear panels.

To create shear panels, we nail vertical 4x8 sheets of 1/2-inch plywood to the top and bottom plates. If we're removing a wall the length of a building, we put plywood at each end of our temporary wall to tie it to the outside walls. If we're removing a 40-foot wall, we'll panel every other 4-foot section in addition to the end sections.

JLC: *What if the saw binds when you're cutting through a stud during demolition?*

Farrell: If I cut studs — for example, the trimmer and king stud — and they bind, I'll put a post or brace next to the area I'm cutting. Also, if I'm cutting nails with a Sawzall and the saw binds, I shim up the area with a temporary wall.

JLC: *What steps can you take to minimize cracking plaster, binding doors and windows, etc., on the rest of the structure?*

Farrell: If the wall finishes are to remain, you don't want any movement in the existing structure. So you want your temporary supports to be very tight without being stressed.

If we're taking out a bearing wall in the center of a house, we measure the height of the bearing wall and frame ours the same. We don't jack unless the wall has a sag. Then we straighten with jacks.

Jacking 1/2 inch per day is a pretty safe level. Then we let the building sit overnight to absorb the movement. Drywall is more flexible than plaster; if you jack plaster it will take a beating.

Even without plaster, too much jacking can cause problems. Last summer we worked on a job where a portion of the foundation had sunk 2 inches. We went under and poured pads, but when we had jacked the walls up 1 1/2 inches, the plates were starting to compress. There was simply too much weight to get it completely level. We didn't want to crack the roof or walls, so we stopped short of perfection.

JLC: *When you replace a large section of wall with a beam, how do you raise the new beam into place?*

Farrell: We use screw jacks and hydraulic jacks when we have to raise large beams into place. The adjustability is a plus because it keeps posts tight against the beams.

We have more confidence in screw jacks, but we sometimes have to use hydraulic jacks when we're in a tight space and don't have room to turn the handle on the screw jack.

Storage and Removal

JLC: *Where do you start when you take down a multi-story building?*

Farrell: We always work from the top story down. Removing material from a second story or roofline, we use a large Sonotube. We place 2x4 braces on the sides and extend these to the ground. Or we use plywood chutes into a truck. Sometimes we'll back a scissors-lift truck up to the house.

JLC: *Any special techniques for carrying debris out of the building?*

Farrell: When we can't pitch debris out a window or off a roof, we use scoops, like a large snow shovel, and wheelbarrows. If we can't get to the room with a wheelbarrow, we throw debris in a large, heavy tarp, get a guy on each end, and roll it up. Then we'll carry it out to the truck.

The most economical way to remove the material is to heave it right into a truck. The demo crew we use owns two large trucks, and as soon as the truck is full they haul it away.

JLC: *How about storing debris on site?*

Farrell: If we need to, we'll make small piles throughout the job site and haul them off as soon as we have a truckload.

However, you never want a large pile sitting around. On one job, a fire started that way and torched a house we had just about finished. The fire marshall concluded it was someone tossing in a cigarette. Now I pick up piles every week.

Safety

JLC: *What kinds of safety tips do remodelers need to remember?*

Farrell: There are a lot of ways people can get injured on a remodeling job, so we pay a lot of attention to safety.

We always fix a broken subfloor with plywood or diagonal sheathing. When we're doing foundations and have exposed rebar sticking up in forms or in block cavities, we use blocks of wood, or plastic balls available from the rebar supplier, to cover the tip of each piece of rebar. If we have a long row, we'll build an L-shaped box of 1 1/8-inch plywood or 2x material, and wire the box over the rebar. A fatal injury from someone falling on a piece of rebar is easy to prevent.

We always make sure our temporary braces are nailed and tight. Temporary walls can move.

We never work under someone else. Even with a hard hat, you can get a nail or debris in your eye, or a hammer could fall from a loop and hit you.

We never do anything out of balance. For example, we'd never lean out a window and swing a sledgehammer. We also never work under an item we're trying to demo. If we're trying to lift or remove a large beam, we don't stand under it. We stand to the side and prop it with sawhorses, ladders, or braces. ■