Tying Into Existing Framing

by David Schwartz

To avoid costly mistakes, understand the existing structure before you add on

To avoid unnecessary exposure to bad weather, open up only as much of the existing structure as you need to install new structural members, like this steel beam.

Building an addition is often more like remodeling than new construction, especially where the addition meets the existing structure. Joining the new to the old — "tying in" — doubles the chances that a problem will sneak up on you. On top of all the problems of new construction, it may also be difficult or impossible to uncover crucial construction details in the existing building before work begins.

Look Before You Leap

The best place to solve problems is in the design, estimating, and contract-writing phases of a job, where it can be done without the use of a nail puller. For instance, in a 20 x 28 two-story addition I recently bid on, the architectural plans specified 2x12 joists for both floors. While I was still doing my cost estimate, I noticed that the existing house had 2x10 joists, making it impossible to match both the ceiling line of the first story and the floor of the second. I couldn't simply substitute the smaller joists in the second floor of the addition because they wouldn't support the span. One solution was to allow an offset where the new ceiling met the old. Another was to divide the span with a flush-framed steel beam and use 2x10 joists. The first solution is cheap and looks it. We used the steel and produced the seamless look that is the mark of a well done addition. It added hundreds of dollars to the cost, but by catching the problem early, I kept the cost from being even higher.

Oversights of this nature are common in designing and building additions, and unless they are caught before construction begins, they will leave the designer distressed, the builder with an idle carpentry crew, and the owner unhappy with both.

In some cases, it's easy to point a finger at the architect; but similar mistakes turn up on my end, and for the same reason — I make incorrect assumptions about the existing building. To reduce these costly errors, I have adopted the following as my number one rule regarding additions: "Understand the structure you are adding on to." This may not be good grammar, but it has proven to be good practice.

The best place to start is with a set of plans for the existing building. The owners might not think to offer it, but if asked, they might recall that there's been one in the back of a drawer ever since they bought the place. While you can't assume everything was built as drawn, there may be valuable information that would be hard to come by otherwise. I recall an elaborate house where I could not fathom what route a soil stack took from a second floor bathroom to the basement. But the original plans showed the location of the stack at each floor, and a telltale bulge around the bell end of the cast iron pipe in the plaster wall nearby

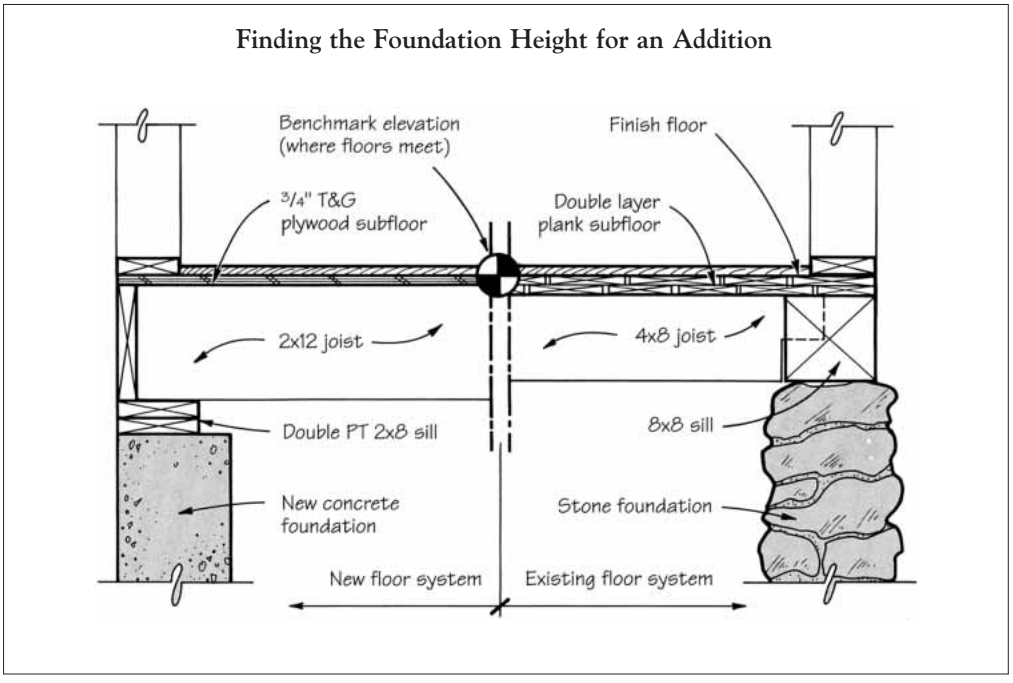

Figure 1. *Floor joists in a new addition may not match those of the existing building. To set the elevation for the new foundation, work backward from the height at which new and old floors must meet. In many cases, the top of the new foundation wall will be lower than the top of the old.*

solved what was left of the mystery.

I also photograph the existing building for later reference. Two or three dozen 35mm photos take the place of all the sketches and half the notes I used to make when I went to look at an addition. I snap the exterior elevations, closeups of the trim inside and out, the interior wall and floor finish, and even the service panel and plumbing. Later, I can sit in my office and search the photos for the things I missed when looking at the building itself — for example, the fact that all the double-hungs on the first floor are one-over-one, but three-over-one on the second floor. The $15 I spend on photos for each project more than pays for itself, even if I only get one job in four.

What to Look For

While it's obvious that you should check the depth of the existing floor and ceiling joists, the size of the rafters, and the capacity of the existing electrical service panel, some things are more subtle. The exterior corner boards, for example, may at first glance appear to be 1x6 when they are 5/4 stock instead.

Unconventional practice. Unfamiliar construction techniques can easily be overlooked or mistaken for their modern counterparts. In Kansas City, Kan., where I do most of my work, many homes have floor joists on 19.2-inch centers. Consider this scenario: The mechanical sub plans to cut out the old rim joist and lead an 8 x 14 forced-air supply trunk down an existing joist bay and over the foundation wall into the crawlspace under the new addition. But when he arrives to do the work, he finds that the plumber has already used the only joist bay in the old basement that lines up with a bay in the crawlspace. True, you can work out this problem without going bankrupt, but had the new joists been laid out differently, it would have been avoided at no cost to anyone.

Level and plumb. Buildings more than a century old present a special challenge. Often, because of inadequate foundations or substandard framing or masonry practices, tying in to these old buildings means choosing between building plumb and level and making some accommodations for the older structure.

To the uninitiated, plumb and level is the quality way to go, but to get an acceptable result, you sometimes can't avoid matching an existing structure that's out of kilter (see "Losing Perspective," at left). Allow for this in your budget and schedule because, while it's easy to build out of plumb and off level due to haste or sloppiness, to do so deliberately and precisely to achieve a particular result is much more difficult.

Opening Up

My first day on site rarely involves breaking ground. Instead, the lead carpenter and I pick apart the existing exterior siding and sheathing to reveal the framing or other load-bearing structure. This demolition has to be done anyway, but we expose only a small area at first so it will be easy to make good against the weather. We usually do this ourselves, even if the siding is brick veneer or stucco. If the layout of the wood framing is out of the ordinary, or if there are wires or pipes in the way, I make a story pole so that later we'll be able to locate the hidden features by transferring marks rather than measuring. We also remove enough siding and sheathing so the foundation work can be done.

Adding on usually means opening up a portion of load-bearing exterior wall, providing temporary support, and inserting new headers or beams. If the addition doesn't add to the load on the wall, I prefer to do this after the new work is closed to the weather. This lets the occupants go about their business undisturbed for several more weeks, and I don't have to make a stretch of wall good against the weather. But if the new structure bears on the old over the openings, I build the headers before we break ground. There is less shoring to do and less risk that I'll have to "remodel" my new work later.

Opening up long sections of load-bearing wall and installing a clear-span beam is not to be taken lightly, even in the case of a "simple" wood-framed house. The total load on, say, 12 feet of first-floor wall in a two-story house may require LVL or steel for the header. I don't hesitate to consult an engineer when I'm unsure of a structural scheme, even if it has been specified on an architect's plans.

Foundations

Complete the foundation phase of an addition as quickly as possible to avoid the mess that rain may make of foundation work. In the case of an addition, the work will take place in an established lawn or landscape, and water may find its way into the adjoining basement. It's a good idea to check the floor drains in the old basement: It's easier to clear them if you don't have to do it through 3 inches of standing water.

I try to expedite things for the foundation contractor by having all the head scratching done before he shows up. On anything but the simplest jobs, I make a large-scale drawing showing the old and new foundation walls and all related wood framing up to and including the finish floor. This means establishing a benchmark elevation for the new foundation. This is usually

Losing Perspective

Some years ago, while working as a foreman for a design/build firm in New England, I supervised the construction of a one-story, shed-roofed addition to a two-story, wood-framed building more than a century old (parts of it were, anyway). I elected to go the plumb-and-level route, without considering any alternatives. When it was done, I was taken to task by the owner because the new shed roof accentuated the settling of the existing building. It cut completely across one row of clapboards. At one end the shed hit the sidewall just below the sill of the second-story window; at the other, the sill stood clear by 4 inches. Some artful "fudging" would have produced a roof that shed water just as well, and perhaps a happier client.

I say "perhaps" because, less than a year later, I was faced with an almost identical situation, except the addition was longer and the old building was even further out of level. But I had learned my lesson. I took the extra time and effort to set the rafters so that the roof hit the second story wall an equal distance below the sill of each of six windows. I knew this created a twisted roof plane, but I assumed it was the preferable alternative. I was wrong. The new standing seam roof drew attention to the problem, and the owners were distinctly displeased with the result.

The moral of this story is communicate with your client (and the architect, if one is involved). Joining an addition to an older building sometimes leaves you facing a problem to which there is no "right" answer, only a choice of compromises. I don't suggest compromising structural integrity or failing to meet code. But if it's a matter of appearance only, inform your clients as fully as possible, and let them make the decision.

— *D. S.*

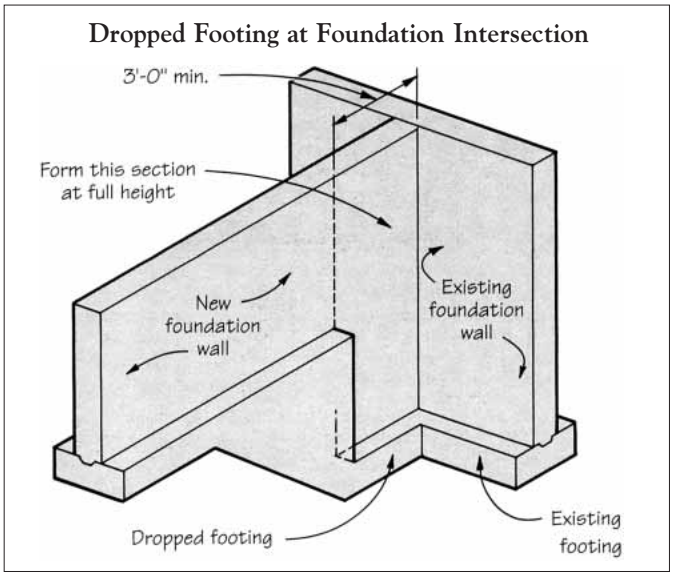

Figure 2. *To avoid increasing lateral pressure from a crawlspace wall against an existing full foundation wall, drop the new footing to the elevation of the existing footing for at least the first 3 feet of the new wall.*

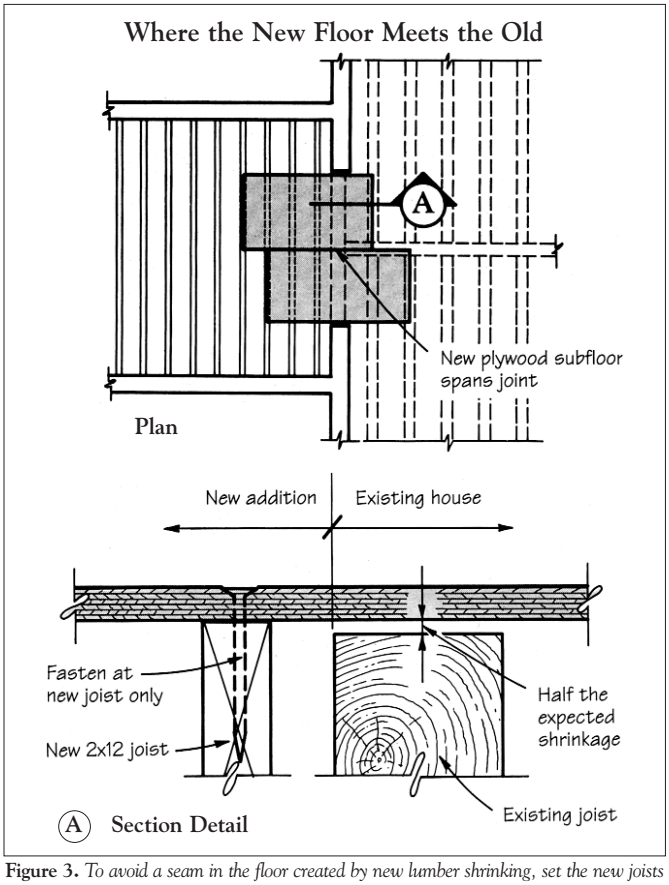

Figure 3. *To avoid a seam in the floor created by new lumber shrinking, set the new joists high by half the expected shrinkage and be sure to span the joint with the new subfloor.*

determined by where the new and old finish floors meet and may mean that the new and old foundation walls will not be the same height where they abut (see Figure 1).

If the addition is built over a crawlspace against a house with a full basement, the footings of the addition will be 3 or 4 feet up on the basement walls. Dick Stein, a structural engineer in Shawnee, Kan., has warned me that, unless the new wall meets the old at an outside corner, the new downward load of the addition can create lateral thrust in the bearing soil and cause the old wall to buckle inward. His solution is to form the first 3 feet of the new wall at full 8-foot height, with the footing stepped down to the elevation of the existing footing (see Figure 2).

Framing

Few framing subcontractors have the skill and patience to deal with the difficulties of tying in to an old building, so my crew and I do our own framing on remodels and additions.

Floors. Ideally, an addition — particularly the floor joists — would be framed with reasonably dry dimension lumber, but in practice, this is very difficult to do. In my area, KD15 lumber is available only occasionally and sometimes not at all. The best I can hope for is a 19% moisture content, so I'm left with 2x10s and 2x12s that may ultimately shrink nearly 1/4 inch. It probably won't matter if the old and new finish floors don't need to meet flush anywhere (where there's a step up or down, for instance), and even if they do, carpet on underlayment can tolerate the movement that occurs after its installation.

But some finish flooring (tile, for instance) won't tolerate movement at all, and may be very costly to repair. In these cases, you should take some extra precautions. Bring the new joists in a bit higher than the old — say, half the anticipated shrinkage. Temporarily fasten the new subflooring with screws in the area where the finish floor will run continuously from the existing building into the addition (see Figure 3). Later, when the addition is closed in and the existing building opened up, remove the temporary subfloor and cut and remove enough of the old subfloor to allow the new subfloor to span the existing and new floor framing about half and half. This isn't a foolproof cure for finish flooring woes, but it tilts the odds in your favor.

Windows. If the new windows are the same type as the old ones, frame the heads of the new rough openings at the same exact height as the old. But if, for example, you're adding clad casements and the existing windows are double-hungs, lining up the rough heads may mean the trim won't line up, either inside or outside. If neither is aligned, it's particularly hard to explain to the client. To lay it out right, you need to have one of the new windows on hand or a head section detail from the catalog.

Roof framing. Roof framing taxes the skill of the rough-in carpenter more than most other tasks. An extra pause before starting to cut rafters to pattern is usually a good idea, even for a simple shed roof. Even when the new roof is independent of the existing one and the two don't actually tie together at all, the fascia and soffit will still need to match or closely resemble the existing.

For a complex roof — a hip and valley, say — I make a full-scale drawing of the eaves details on the deck or a sheet of plywood. Sometimes I go so far as to nail in a mock-up of the fascia and soffit after the first two rafters are set. If the new roof has a different pitch from the existing roof, it is difficult to bring the eaves trim together.

Get the roof work done quickly. Tying in the new roof usually means opening up the existing structure to such an extent that making it good against the weather can be tough if bad weather comes along. On a small addition, my crew and I can sometimes delay stripping the old roof and tying in to the roof structure until the afternoon before the roofer is scheduled. Then we'll either go ahead or not, depending on the weather forecast. But the weather here is so notoriously unpredictable that, even when clear skies are expected, I protect the work from a thunderstorm.

Trusses. The very first time I ordered gable roof trusses to extend an existing roof, I carefully measured the rise of the existing trusses from top plate to peak and asked my truss builder if he would make the new ones just that way, even if it varied from his standard pattern for that pitch and span. He readily agreed and then sent me thirteen trusses, all 1 1/2 inches too low at the ridge. I had no shop drawing or paper trail to fall back on, and faced with a probable argument and a certain week's delay even if I won, I accepted the trusses. We made them work by shimming out the difference at the ridge over the first three trusses. Amazingly, the homeowners thought the result looked okay.

Now when I use trusses for roof framing, I won't authorize any to be made until I have a shop drawing for approval.

Trim

Because our work is often on older homes, trim and moldings are difficult to match with the stock patterns available today. Several of the local millwork houses and lumberyards will do mill-to-pattern molding work, and we use their services about as often as not. Some have accumulated hundreds of knife sets over decades of work, and once in awhile they can locate knives for the very molding we need. If not, most do their own profile grinding. The cost for grinding a knife set is typically $30 to $40 per inch, and there is a flat charge of about $50 to $80 to set up the equipment. (The setup charge is often reduced for a sufficiently large run of one pattern.) If you supply a physical sample of a molding (as opposed to a profile drawing), you can get a reproduction true enough to splice right into the existing molding, with only a little hand sanding required to produce a seamless result. ■

David Schwartz learned the trade in New England and currently runs his own building and remodeling company in Overland Park, Kan.