

Framing a Grade-Level Deck

Building close to the ground demands tighter tolerances

BY CHRIS AHRENS

The traditional raised deck frame is a beautiful balance of structural function and adjustability. A ledger attaches through the wall sheathing and into the floor frame of the house, joists extend out from the ledger across the top of a built-up beam, and weight is transferred down support posts to footings below. The height of the deck is usually driven by the elevation of the house's floor framing, and then a set of stairs runs from the deck to the ground.

It's an easy template for any intermediate builder because it includes lots of flexibility when it comes to footing heights, post lengths, and beam leveling. It also offers plenty of underdeck access for grading and moisture management. Many builders assume that constructing a grade-level deck means shifting to a different technique—ditching the ledger and going to a freestanding structure, or swapping a carrying beam for a flush beam—but in fact, all of the traditional methods can still be used. You don't need to make drastic changes to the way

the deck is assembled; you just need to modify how you tackle three of the structural components: the ledger, piers, and beam.

Working within a foot or so of ground level means that you have less room for adjustment. On the deck shown here, for instance, there wasn't enough space for posts, so the beam sits right on the footings. This single change meant that footings had to be poured level to each other and that their height couldn't be figured accurately until the ledger was set on the wall.

The challenges begin with the ledger

A typical ledger-supported deck is fastened to the house at the rim joist. But to set the deck close to grade, the ledger might need to be attached to the foundation. This involves both challenges and advantages.

To start with, fastener options will change. On solid-concrete foundations like this one, you can attach the ledger with wedge bolts or with standard bolts set in epoxy or acrylic adhesive. Gone are the days



of using lag shields for ledger attachments; they aren't up to snuff for structural deck connections. You can't use wedge bolts if you're attaching to a hollow-block foundation, but adhesive anchors will do the job as long as you set them in mesh screening or tubes, which gives the adhesive solid purchase inside the hollow block.

Attaching the ledger to the foundation may also mean spanning cast-in-place windows (see "Q&A," *FHB* #248). On this job, we had two. Your building official has the final word on this subject, as there are no deck-specific requirements in the codes. From a structural standpoint, though, this is not a major departure from standard floor framing. Building codes for floor framing allow the use of a single structural header when spanning a space of 4 ft. or less, provided the header is the same size or larger than the joists attaching to it.

Another challenge that you might encounter is how to deal with a foundation that has dips and humps on its face. Attaching a ledger to the rim joist generally goes easily because it would have been in the



To see a multipart video series of the complete construction of this deck, visit FineHomebuilding.com/projecthouse.

THE LEDGER SETS THE ELEVATION

The ledger is not only the structural connection between the deck and the house; it's also what establishes the overall height and levelness of the entire deck frame. On this project, the 2x10 joists of the main deck frame sit just about even with the top of the foundation, and a landing framed with 2x8s sits atop the main frame, serving as a transition point between the lowered deck and the patio door.



Any level line will do. You don't have to bother adjusting the height of a laser to project a ledger guideline at just the right elevation. Instead, project a level line somewhere near where the ledger will attach, and then snap a line to be used as an offset benchmark for the rest of the elevations.



Gauge blocks guide the ledger. After determining where the ledger will attach in relation to the benchmark line, mark the offset on both ends of a pair of 2x8 cutoffs—the material that will be used to frame the landing. Align the marks on the blocks to the benchmark line, and screw them to the wall.



Two nails let you focus on the drilling. Lift the ledger so that it's tight against the bottom edge of the gauge blocks, and then shoot a powder-actuated nail into each end of the ledger to tack it in place. Drill a hole and set a bolt on each end of the ledger before drilling all of the other bolt holes.

best interest of the framer to set that rim straight when building the first floor. By contrast, the dips and humps left in a foundation wall by its form boards aren't crucial to anybody but the deck builders trying to put a ledger onto that wall, so the concrete might be pretty out of whack.

Don't fuss with trying to get the ledger straight, though; just secure it tightly to the wall, and adjust things at the outer edge of the deck frame by letting joists run long, snapping a chalkline, and cutting the joists to an even length.

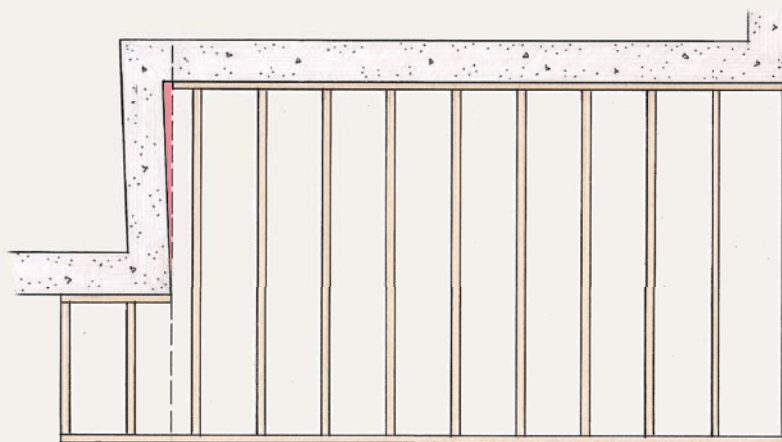
If all of this sounds like a hassle that you don't need, consider one major benefit: There's often no need to peel back siding or worry

about ledger flashing—that is, unless you pulled off an old deck and had to patch in siding, as we did on this job. It's still a good idea to run flashing up under the bottom course of siding if the ledger will be set tight to the siding, but there's no need for that if the ledger is lower on the foundation wall. The only concern here is water getting behind the ledger and not being able to dry out easily. This problem is prevented by applying a bead of sealant at the joint between ledger and foundation.

The last piece of advice I have on this topic is to think ahead about how to handle the logistics of holding, aligning, tacking, and permanently fastening the ledger. Wet pressure-treated lumber is heavy,

Dealing with a dropped deck

Attaching a deck ledger to concrete rather than the house's framing can mean dealing with some new challenges. The most common ones I've found are jogs in the foundation that aren't square, concrete walls that aren't straight, and basement windows that are in the ledger's path.



Out-of-square corners

If the deck will wrap around corners or jogs in the foundation, check the foundation corners for square before setting the ledger. If you simply follow the jogs of the foundation, you could end up with an out-of-square frame.

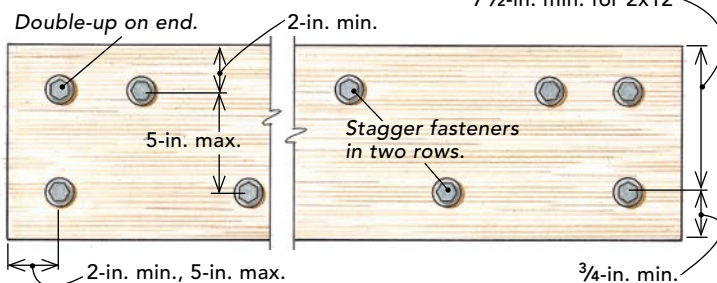


Nuts before hammers. Use the predrilled ledger as a template for boring the holes in the concrete. But before whacking the wedge anchors into place, put a washer and a nut onto each bolt. A hammer can damage a bolt's leading threads and make it impossible to get the nut started if it's not already in place. Give the nut enough spins to ensure that it won't be hit by the hammer.



LEDGER FASTENING BY THE CODE

5½-in. min. for 2x8
6½-in. min. for 2x10
7½-in. min. for 2x12



but it seems to get even heavier when you're in a crouched position trying to hold a long ledger to a snapped chalkline while freeing up one hand to fasten the board to the wall. Whenever possible, I use powder-actuated nails to tack temporary support blocks to the foundation to ease my back, free up my hands, and let me focus on positioning the ledger just right.

If you prefer, you can also tack the blocks to the wall framing above and then lift the ledger up tight to the blocks before pinning it to the foundation. This method is helpful if your deck will have a landing between the main part of the frame and the door to the house, which is the situation we had on part of this deck. In this case, we

established our final height and then cut blocks from the framing lumber that would be used later for the landing, creating a sort of real-life story pole.

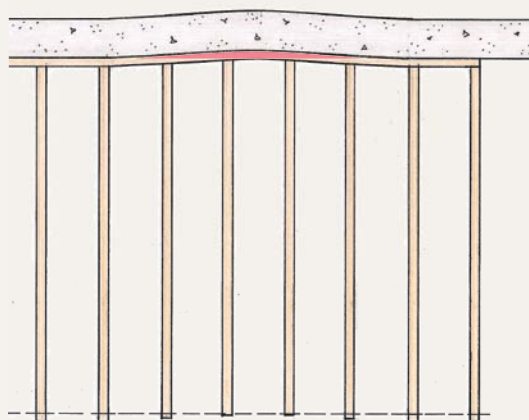
Whatever you do, take your time at the ledger. Installed carefully, it will make the footings, the beam, and the rest of your deck frame easier to build.

Piers are hard to get perfect

When digging 42-in.-deep holes 7 ft. apart in rocky soil, then placing footing tubes in a straight line and filling them with concrete to the same finished height, there are any number of ways for mistakes to

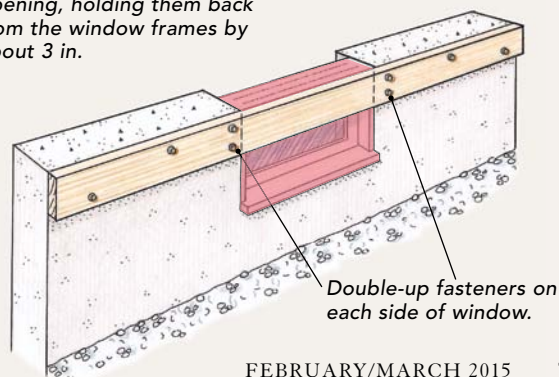
Wavy walls

Always knock off excess concrete left by the form ties to help ensure that the ledger lies flat against the wall. Even then, the ledger might not be perfectly flat. If you try to set joists cut to size, the opposite ends won't line up. Instead, let the joists run long over the beam. Before attaching the rim, snap a straight cutline, and trim the joists evenly.



Basement windows

As long as the building official approves your plan, you can span the ledger right over small basement windows. In these cases, double-up the ledger fasteners on each side of the opening, holding them back from the window frames by about 3 in.

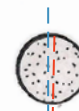


CALCULATE PIER HEIGHTS

The height of concrete piers isn't crucial on a raised deck, because leveling the beam is a matter of adjusting the length of each post running between pier and beam. But for a grade-level deck, where the beam is set right on post bases anchored to the top of the concrete piers, there is far less room for error.



Nails mark the pour. Rather than cutting the tubes at the finished height before pouring concrete, poke nails through the cardboard to serve as height indicators.



STRAIGHT TRUMPS PARALLEL

It's not crucial for the beam to be exactly parallel to the ledger and the deck rim; it just has to be straight and to land fully on the piers. With the ideal beam centerline (red) marked on the two end piers, stretch a chalkline across the row of footings to visualize the centerline of the other post bases. Before snapping the chalkline, adjust the two ends of the line either in or out to be sure that each post base will bear fully on its pier.



Blue: Distance from ledger to pier center, according to plans

Red: Beam position adjusted to land on all piers



creep in. It's important to aim for perfection, but it's crucial to understand how to deal with problems.

If piers aren't poured level to one another, the only option is to find the highest pier and then shim under the beam on the lower ones to meet the same finished height. In this situation, I still anchor the post bases to the concrete, but then I add shims between the post base and the underside of the beam after it's been nailed together and set in place.

If the piers aren't perfectly aligned to one another, then you have to find a new centerline for the beam. Forget about whether the beam

runs perfectly parallel to the ledger—this really isn't important in a situation where deck joists run continuously over a beam anyway—and focus on setting the beam so that it bears fully on the piers. This desire for wiggle room in positioning the beam is why I use 12-in.-dia. footing tubes, even if I can get away with smaller ones, and why I opt for bolt-down post bases rather than the anchors that are cast in place.

The last thing to check before starting to set joists is that your site is graded and detailed to deal with moisture. A deck set low to the ground won't have much airflow below it. This will increase the risk

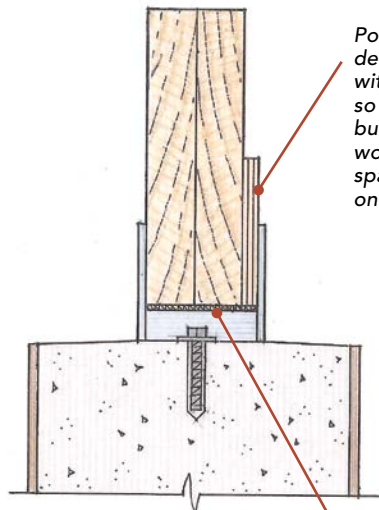
BUILD THE BEAM IN PLACE

It may be only inches from the ground, but the carrying beam in a grade-level deck does the same job as a structural beam 10 ft. overhead. It should be built strong, set level, and protected against rot.



Align and fasten. One person holds the two halves of the beam so that the tops are in alignment before the second person nails them together. Building codes recommend the use of 10d threaded nails set in two staggered rows, with 16 in. between nails. The author nails more liberally.

DON'T FORGET THE SHIMS AND SPACERS



Post bases are designed to be used with 4x4 or 6x6 posts, so two- and three-ply built-up beams require wood or plywood spacers installed on one side at each pier.

If the beam needs to be shimmed to get it level, use shim stock that won't compress under load and won't deteriorate from rot or rust. Galvanized metal tie plates (sometimes called strap ties) are a good option and can be bent in half for extra thickness.



Protect the seam. The joint between pieces of lumber in a built-up beam is a notorious trap for water and debris, and will eventually lead to damage, even with pressure-treated lumber. A strip of self-adhered flashing is a cheap weapon in the fight against the elements.

of rot in the frame and of moisture-related issues above it, such as cupped deck boards.

The basics of moisture control are simple: Start by sloping the ground for drainage; you don't want water to settle under your deck. After that, put down several inches of gravel. Moisture wicks up to the surface through soil by capillary action, which only works when water can go from larger pores to smaller ones. Such a path is found easily in soil. Gravel creates a layer of larger pores that short-circuits capillary action, helping to keep the moisture in the soil and away

from the deck. Landscape fabric below the gravel keeps dirt out and weeds from sprouting. Finally, never let any part of the deck frame touch the ground. Unless you're using lumber rated for ground contact (see "What's the Difference?" p. 32)—a rating that common pressure-treated lumber does not carry—the wood is not meant to be in direct contact with the ground. □

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