Efficient Deck Framing

Detailed plans and thoughtful layout speed construction and improve quality

by Rob Arnold

My company specializes in building exteriors, both residential and commercial. We make most of our revenue (62 percent) from two specialties: residential decks and commercial framing.

That may seem like an odd blend, as the goal in commercial construction is to get it done fast, while with residential decks it's the quality that counts. They're not mutually exclusive, though. The key to speed isn't simply rushing through the job, it's becoming more efficient, and the systems I've developed to streamline the process have also yielded more consistent and higher-quality construction.

By applying the approach I use on commercial jobs, I've created a system for building decks that's both fast and accurate — and that keeps even a nagging customer happy — while providing an excellent bottom line.

At the Desk

First and foremost is to think the entire job through so the crew knows exactly what to do from the moment it sets foot on the site. The first time I approached a job this way was when adding dormers to a house. We did all the figuring before we got to the site, then built the dormers on the ground and lifted them into place in a couple of easy pieces.

Compared with dormers, decks are a piece of cake. I start at my desk, where I make sure the plans contain every detail and upgrade that the homeowner desires (**Figure 1, page 2**). I make several copies of the final plans to scribble on and to use for generating material take-offs and cut lists. Each step in the construction process — footings, framing, decking, railings, and extras — has a dedicated set of plans.

The plans for the footing layout are critical. Whether they're for an 8-foot-by-12-foot residential deck or 4,000 square feet of commercial deck, clear footing plans will save a tremendous amount of on-site head scratching and will jump-start the digging. I use my Construction Master (Calculated Industries, 800/854-8075, www.calculated.com) calculator to figure the locations of each footing in reference to the face of the ledger.

To locate each footing, I write down the perpendicular distance to its center from the ledger and calculate a hypotenuse from each corner of the ledger to each footing. The more information on the plans, the easier it will be for the guys on my crew to double-check that they're installing the footings correctly. The name of the game is to make building dummy-proof so your employees can make money for the business.

Still at the desk, I create a framing layout that

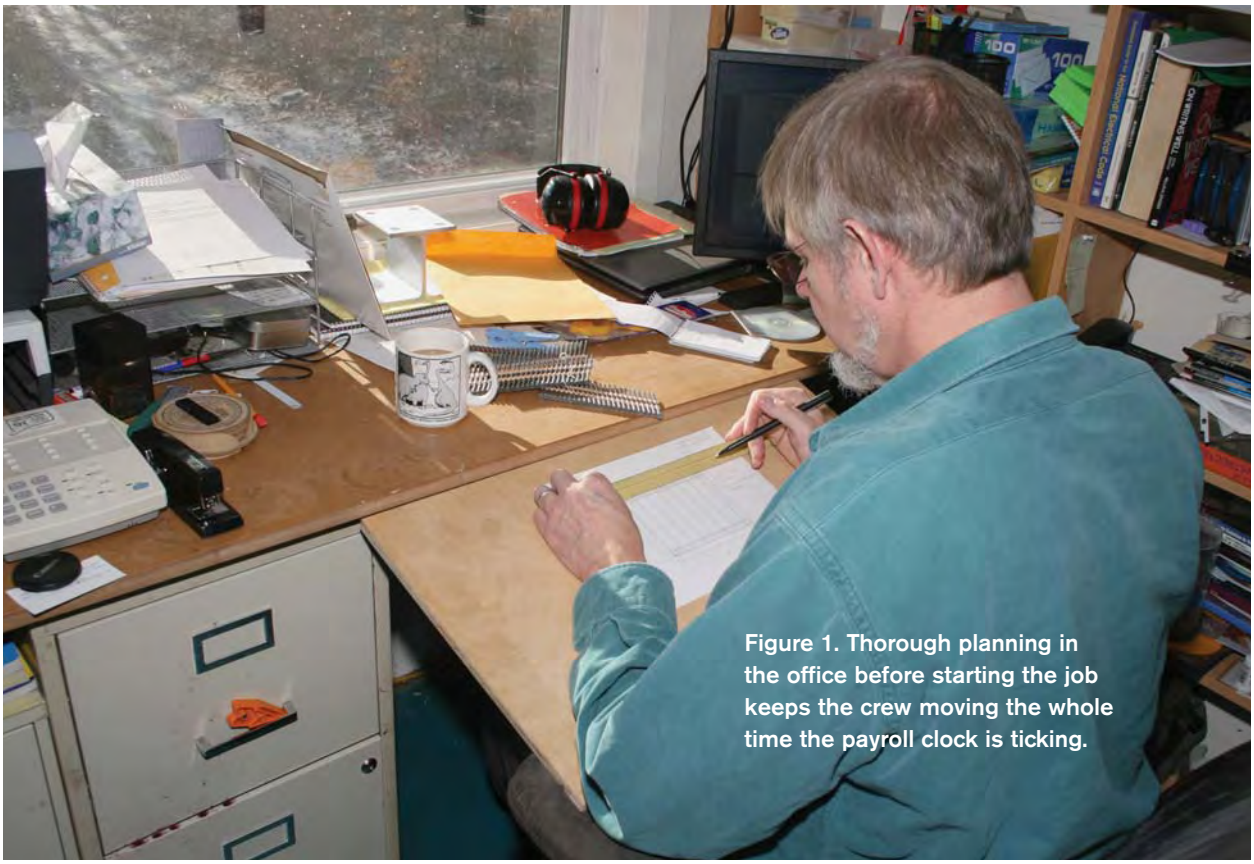

Figure 1. Thorough planning in the office before starting the job keeps the crew moving the whole time the payroll clock is ticking.

includes the ledger, rim, joists, and beams. On this, I figure out the exact locations of guardrail posts, benches, planters, and blocking, including any needed to support a creative pattern in the decking. I calculate the lengths of all posts, beams, joists, blocking, and custom features and generate a cut list with six groups: beam, outer box, joists, guardrail posts, blocking, and upgrades like planters and benches.

To account for variations in material thickness, all blocking is specified to be cut shorter than the nominal dimensions of the lumber would dictate. For example, blocking between joists on 16-inch centers would in theory be 14 1/2 inches long (16 inches – 1 1/2 inches). But I specify it to be cut at 14 3/8 inches because treated joists are usually thicker than 1 1/2 inches and are often cupped; shorting the blocking by 1/8 inch allows for this.

On simpler projects, there won't be much figuring and the cut list will be short. On more complex projects with angled bump-outs and different levels, each section is separated into workable areas, and each area is grouped on the cut list as for a simpler deck.

I'll even set up a laser transit on site beforehand and figure out the overall rise of the stairs. With this information, I can decide at the comfort of my desk what size to cut the stringers.

The idea is to make the project into an easy puzzle. I'd like to think that I could give my list to anyone on the crew and he'd be able to finish the project with precision and speed, by following the steps.

Setting Up

With the planning done, we're ready to go on site. But before getting any tools out, I create a functional working environment. Locate the material pile or the main cutting station in the wrong place, and you end up working around them for the entire job. I take five minutes to lay out the cut stations, the material stacks, and the spot to eat lunch. Give yourself enough room to cut and install comfortably.

Another time-consuming part of building is cleanup. It took a couple of years, but I learned to keep a barrel or wheelbarrow next to the cut station to take care of scraps as they come off the saw (**Figure 2**). Eliminating double handling of scraps can save 30 minutes a day. Taking the extra time to set up properly will have you moving quicker and easier, and installing more safely and efficiently.

Figure 2. Setting up a wheelbarrow or garbage can for scraps at the cutting station is an easy and fast way to keep the site cleaner.

Planning Pays Off

I install and flash the ledger before laying out the footings, ensuring the footings will be accurate to the plans created at my desk. I usually run a string line across the installed ledger to see if the wall is bowed out or in. If the ledger has more than a 1/4-inch bow in it, I'll adjust the joist lengths accordingly (**Figure 3**). Once the ledger is done, I set one crew member up at the cut station and two on footings and layout.

Depending on the size of the crew and the size of the job, it may take a full day to lay out, dig, and pour all the

Figure 3. Houses aren't always straight, so the author checks the ledger with a string. Variations greater than 1/4 inch mean that the joists will have to be custom cut.

footings, and cut, crown, and organize all the framing members. At the end of the day, though, the puzzle is ready to go together.

The person at the cut station doesn't only cut, he also crowns and organizes the pieces on the cut list — and he marks the joist locations on the beam and lays out the guardrail posts on the side and rim joists, using the detailed plans. If he gets ahead, he can nail the hurricane ties for the joists to the beam (**Figure 4**).

The other crew members use the detailed footing layout to locate the holes, starting with the outside corner footings and working toward the middle (**Figure 5**). Taking an extra minute to make sure the footings are set properly makes your work look much better. If all the measurements are followed, no posts should end up off-center on a footing.

Once the forms are in place, I use my laser transit to set the level I'll pour the concrete to (**Figure 6**). Placing all the concrete to the same level makes life much easier later because all the posts can be cut to the same size. If the grade around the deck varies too much, however, some of the footings will stick out of the ground like a sore thumb. In that case, I keep the footings about the same distance out of the ground and cut the posts to length individually.

Figure 4. The person assigned to the cut station also assembles the beams, going so far as to lay them out and nail on the hurricane ties.

Figure 5. While one crew member starts cutting, others lay out the footings using a precalculated length for the diagonal measurement.

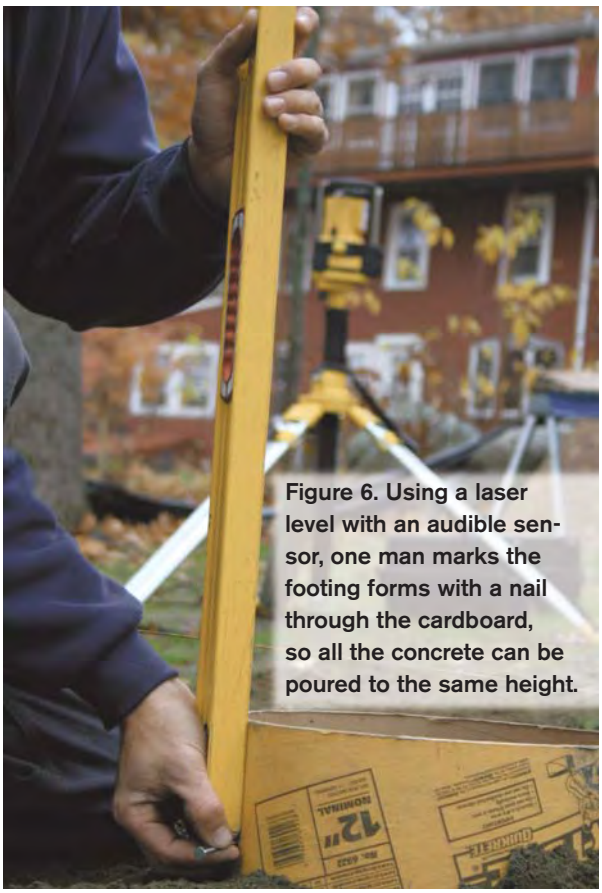

Figure 6. Using a laser level with an audible sensor, one man marks the footing forms with a nail through the cardboard, so all the concrete can be poured to the same height.

I set anchor bolts in the wet concrete, aligning them on a string line from the batter boards (**Figure 7**).

Cantilevered Joists

I prefer to support the outside of the deck with a beam, cantilevering the joists beyond it. Installing the beam is the first step. Assuming that the ledger is of the same material as the joists, the top of the beam must be level with the bottom of the ledger for the deck to be level.

To find the height difference between the tops of the post bases and the bottom side of the ledger, I use a laser. From that number, I subtract the width of the beam plus 3/16 inch to allow for the thickness of the post-to-beam connectors. This calculation provides the height of the posts that will carry the beam — one of the only measurements I can't predetermine at my desk. Variations in dimensional lumber and the height of the concrete are the determining factors.

I cut posts using a worm-drive saw with a 10 1/4-inch Big Foot Adapter (Big Foot Tools, 702/565-9954, www.bigfoot tools.com). With one line and one cut the post is ready for installation (**Figure 8**).

The outer posts are attached to the pre-cut and laid-out beam, and the assembly is raised into place like an exterior wall. Once the beam is plumb, toenailing the outside joists secures and steadies it. Next, I infill the remaining posts, and the beam is ready to support the rest of the joists.

Figure 7. Precise placement of anchor bolts speeds locating the post bases.

Figure 8. The right tool can be a big timesaver: The Big Foot Saw Adapter allows for a 10 1/4-inch blade in a standard Skilsaw and cuts 4-inch stock in one pass.

Cantilevering joists over a beam provides a level platform on one side of the deck to rest joists on, and means that one person alone can install a joist. To double the speed of joist installation, I use two guys, one at each end of the deck. At this stage, they just drive a couple of toenails into the ledger, and none in the outer beam (**Figure 9**). A crew member with a metal connector nailer will follow behind and install the joist hangers.

Once the joists are placed, the outside rim is ready to be fastened. When installing the rim, flush its top with the top of the joists (**Figure 10**). This will cause some joists to float above the beam due to the variations in dimensional lumber. Floating joists are shimmed and all are fastened to the beam.

Figure 9. Resting the joists on the girder, one carpenter toenails them in place (above). A second crew member follows behind, using a metal-connector nailer to fasten the joist hangers (left).

Figure 10. Before being attached to the beam, the joists are leveled with and nailed to the rim joist. Shims are added between the joists and the beam if needed; then the pre-installed hurricane ties are nailed to the joists.

Quick Guardrail-Post Installation

With the floor framing finished, it's time to install the guardrail posts, bench posts, and detail blocking for decking patterns. While one crew member is still installing hangers and hurricane clips, the other two split up the remaining blocking and post installation. All post locations have already been laid out by the cut guy, so all I have to do is install the posts.

On other crews, I often see two people installing posts — one holds a post while the other lags it into place. This should be a one-person job. I mark the location of the top of the joist on the bottom of the pre-cut posts, and set a 12d nail one-third of its length into the post. The nail supports the post on the joist while I drive a LedgerLok screw (FastenMaster, 800/518-3569, www.fastenmaster.com) to hold it temporarily in place (**Figure 11**). Many crews notch posts to set their heights; however, notching a 4x4 post doesn't leave enough meat to resist the code-required 200-lb. load for guardrails — and it's time consuming.

After all the posts are set, I go back to plumb, bolt, and install a hold-down bracket on each one. When installing three or more posts on the same joist, I set and fasten the outer posts plumb and run a string line on the outside of the posts from one to the other. This saves time when installing the inner posts on the same rim. Instead of pulling out the level and checking each post, I set them to the string and fasten them properly.

Figure 11. A nail placed in the side of the newel supports it while it's initially secured with LedgerLok screws. Later, the newel is shimmed plumb and secured with a DeckLok Bracket or a Simpson HD5.

Figure 12. The last step in framing is installing blocking for items such as benches, decking patterns, or planters.

Finally, all the odd blocking is installed (**Figure 12**). Decking patterns can dictate certain blocking locations. For example, I often run a picture frame of decking around the deck for a cleaner look. To support the ends of the deck boards and the perpendicular picture framing, 2x4 cleats are needed on the inside of the two end joists perpendicular to the house. Once guardrail posts, planter posts, and blocking are installed, the crew member that installed the joist hangers and hurricane clips uses the framing plan and the post-detail plan to double-check the installers' work before moving on to the next step.

The more you figure out at the comfort of your desk, the smoother the layout and installation will go. Every crew member always has a task, and often one is doing a task alone that other crews do with two guys. I also like to give crew members different responsibilities from one job to the next. It cross-trains the employees and prepares them for a job with a missing team member. ❖

Rob Arnold owns Efficient Exteriors in Hopkinton, R.I.