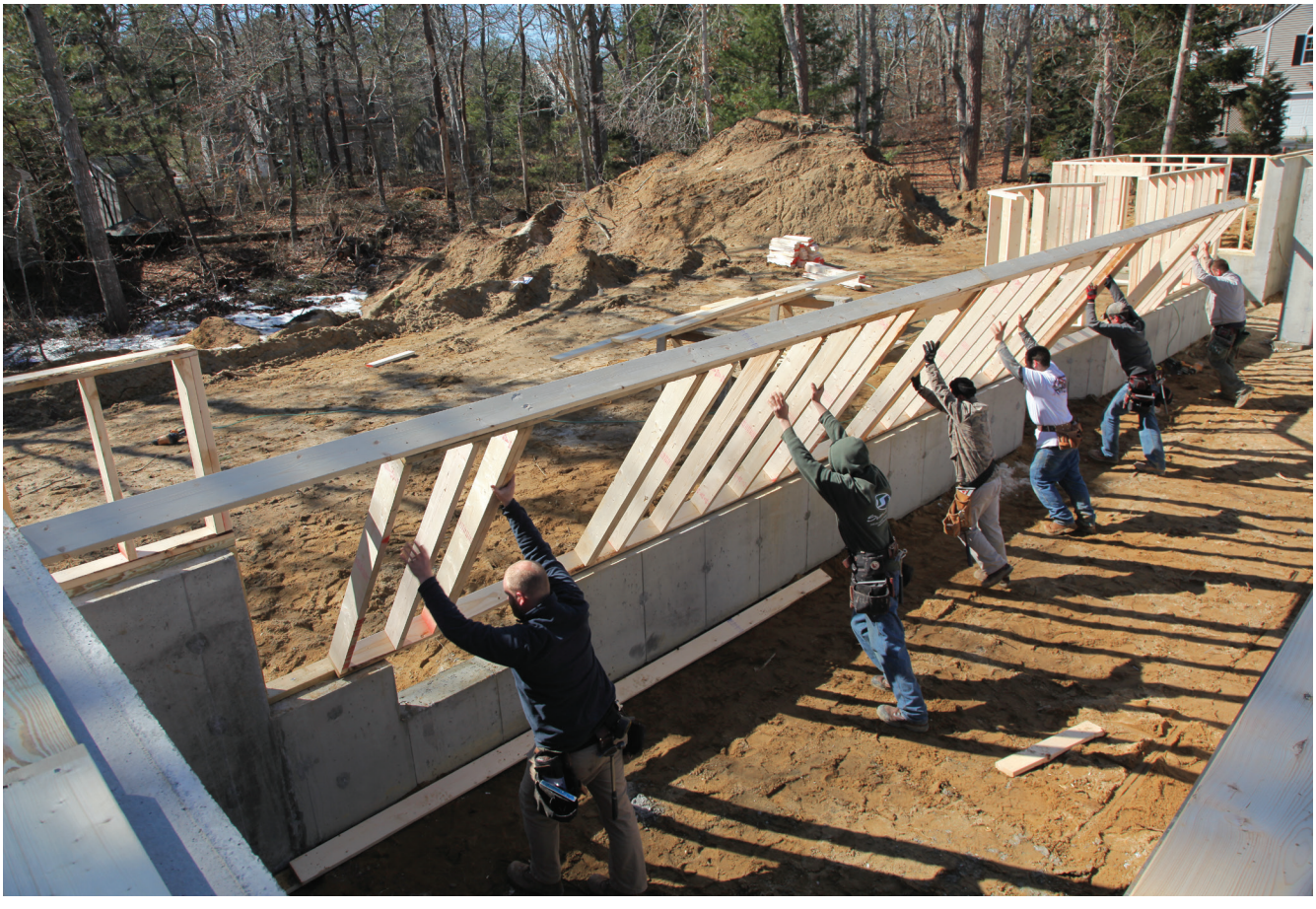


First-Floor Deck for a Complex Foundation

With the sills done, the next step is floor framing

BY MATTHEW ANDERSON

As I mentioned in my previous article ("Mudsill Layout for a Complex Foundation," May/14), I own a residential framing company on Cape Cod that focuses on delivering quality framing in a timely manner. The "timely" part can sometimes be a challenge on a high-end, complex frame, while the "quality" part remains mandatory.

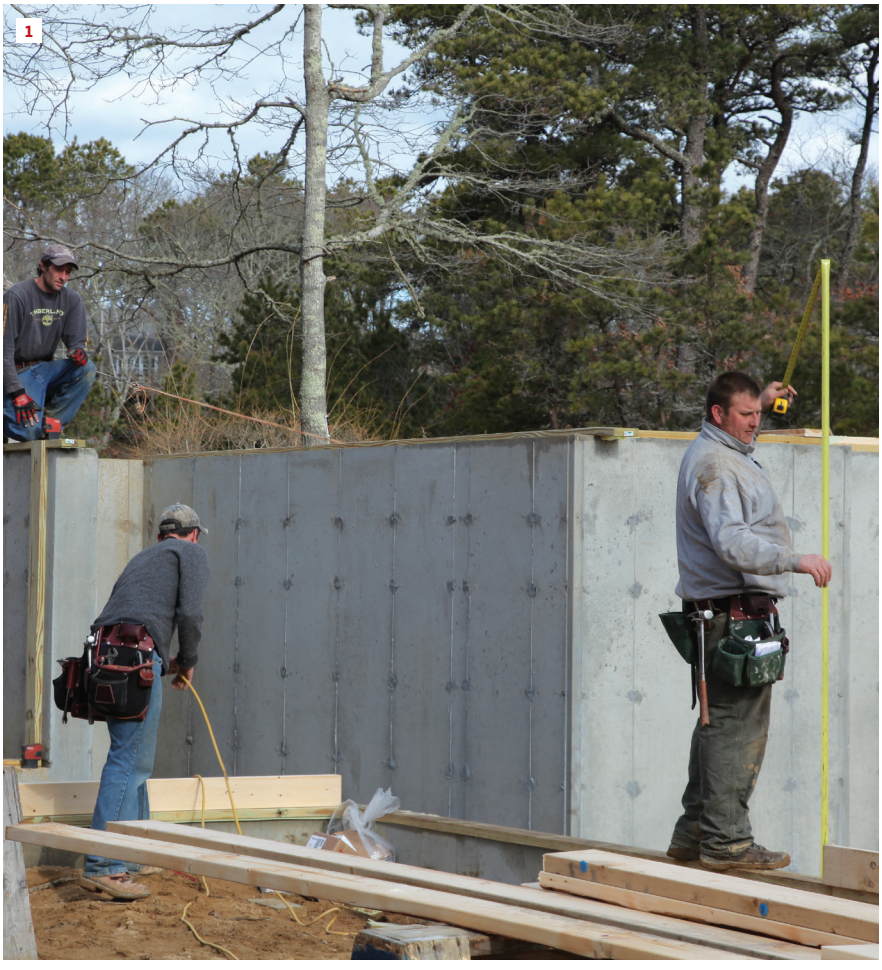
In this article, I'll pick up the same job where we left off and will explain how we went about framing the first-floor deck. I'll share a few of the techniques we've developed over the years to achieve both our time and quality goals.

In the previous article, we had left off at lunchtime, having completed squaring the foundation, snapping out all of our sill lines, and temporarily attaching all of the 2x6 PT sill stock. We were now ready to begin the next step: framing the drop walls for the walk-out portions of the foundation.

FRAMING DROP WALLS

I begin by cutting in the plates for each individual wall section and determining the stud height. To get a stud height we use a laser to shoot a line across the rear of the house and check measurements every 8 feet **(1)**. Our tolerance is plus or minus ⅛ inch, so as long the foundation level doesn't vary more than this, we can choose

Photos: Roe Osborn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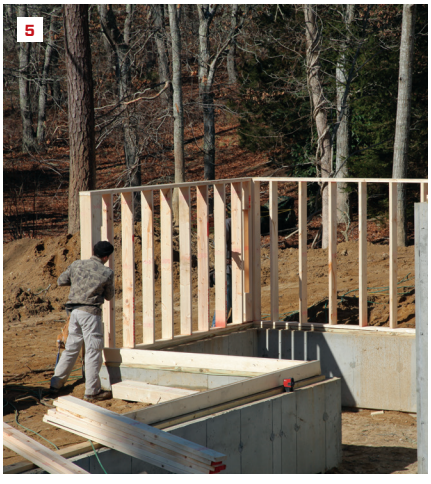
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one stud length. Fortunately, we were working behind a good form contractor on this job and were able to work within our ⅛-inch tolerance. If the foundation hadn't been level, we would have adjusted the stud lengths as necessary to ensure a level first floor.

With the stud length established, one crew member begins cutting studs to length and another starts nailing corners together (we use three studs to box out our corners for insulation and nailing), while a third begins to cut parts for window and door openings.

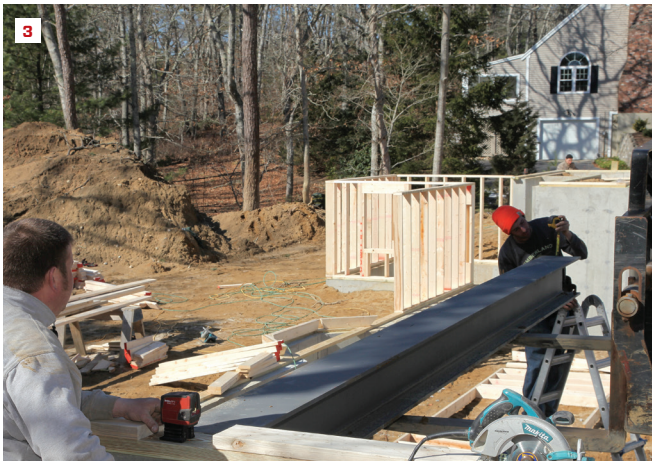
As the crew cuts parts, I begin marking layouts on the sills on the lowest part of the foundation. When laying out, I always begin by marking out door and window locations, followed by marking out partition backers and structural posts. Finally, I complete my wall layout by marking 16-inch on-center stud locations.

It's important to pull stud locations from the same corners as those we will use to pull joist and rafter locations **(2)**. That allows us to easily stack studs, joists, and rafters, providing for direct load bearing from roof to foundation. This also creates the clearest possible stud bays, which makes life a bit easier for the mechanical trades that will follow behind us. With everything cut and laid out, the crew is ready to nail together the walls.

GIRDERS

Four crew members start building the walls on the floor of the basement while another employee and I prep the steel girders for installation. To span the basement, we'll have three sections of steel supported by two intermediate posts.

We begin by making sure that the beam pockets in the foundation are at the proper depth to put the top of the beam in plane with the top of the PT sill on the foundation walls. After checking that the beam lengths are correct, we use a telehandler and its tilt carriage to carefully lift the first beam and set it in the beam pocket. We apply construction adhesive to the top of the beam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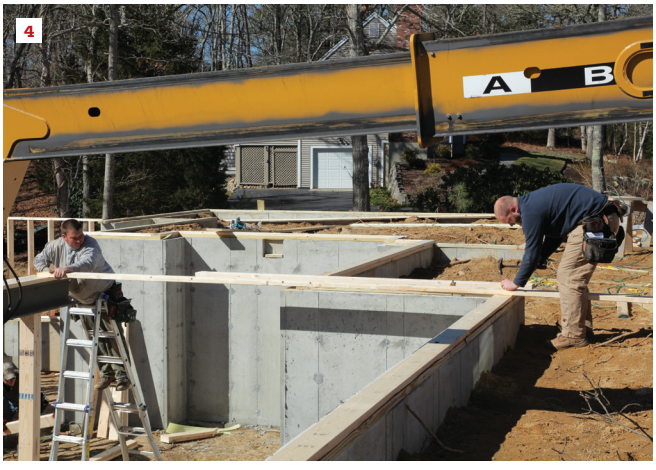

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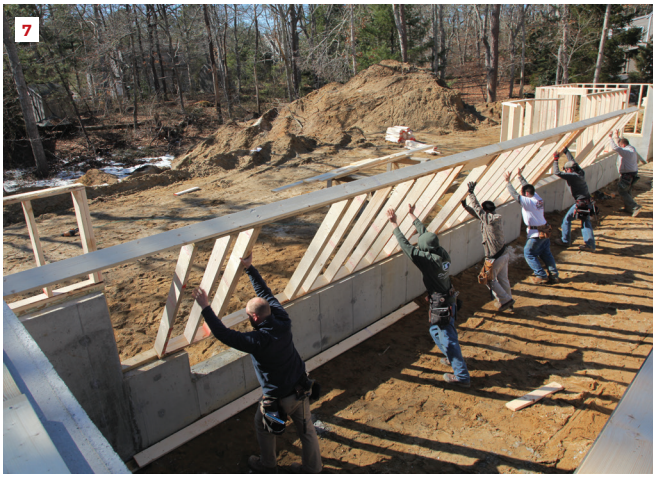
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and attach a PT 2x8 nailer using 1⅞-inch powder-actuated fasteners. At the beam pocket, this nailer laps over the top of the mud sill, tying the beam to the exterior wall. At the other end of the beam, we let the nailer overhang by a couple feet to tie into the next section of beam.

Using our laser and the telehandler, we level the beam **(3)**, then make sure it's parallel to the front wall **(4)**. Once it's level and braced to the exterior wall with a 2x6, we measure from the concrete to the bottom of the beam. With this number we can make a triple 2x6 column to carry one end of the beam.

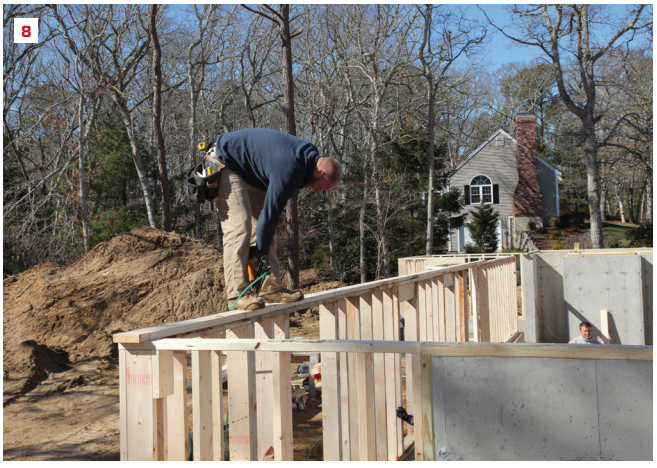
The overhanging section of the nailer now helps to align the second length of steel. We build a second column and slip it in right next to the first column to support the end of the second beam. Then the process repeats itself: attach another length of nailer, brace the second beam parallel to the wall, level that section, and support the far end with a triple 2x6 column. Again, we repeat the process for the final length of steel until all three beams are braced in place and the nailers are tied into the sill plates at both ends.

STANDING DROP WALLS

As we're installing the steel, the other crew members stand up the shorter of the drop walls and nail them off to the sills **(5, 6)**. Working together, the entire crew picks up the long wall across the back of the house and places it on the top of the foundation wall **(7)**. We nail the long wall to the plates as well as to the smaller walls, which will temporarily hold it in place.

With all of the drop walls standing, we secure all of the corners and install the second top plate onto the walls. We lap the second plate over all joints in the lower plate and lap the plates at all corners to lock the wall sections together.

To give us one set height for the entire first-floor deck, we align the first (lower) top plate on the drop wall with the PT sill on the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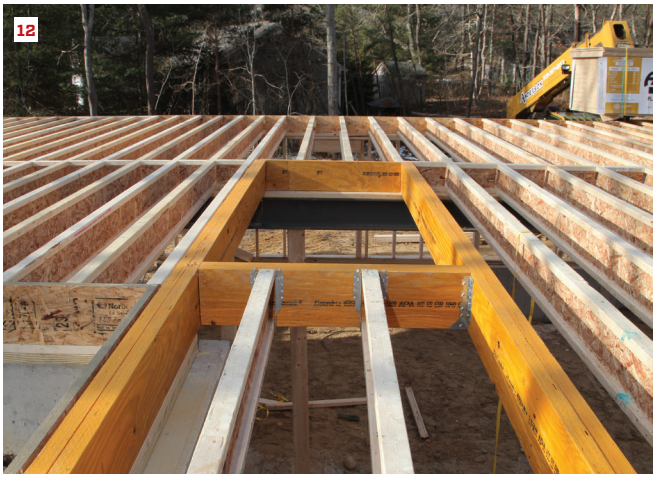
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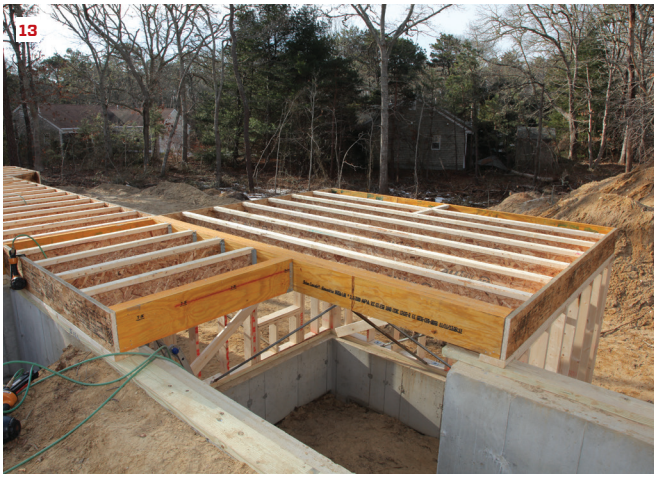
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full-height foundation walls. Then we run a second KD sill plate around the perimeter of the foundation **(8)** that laps onto the drop walls as the second top plate. Again, we make sure that we lap all seams and corners. We also lap on to the framed drop walls wherever possible.

With the secondary sill plates installed, the steel set, and all walls framed and standing, we brace the rear wall plumb and straighten it by stringing and blocking the entire length. With such a long drop wall, it's important to make sure it is parallel with the foundation wall, which we confirm by measuring the distance between the rear and front walls at several places **(9)**. We use 2x6s to brace the drop wall back to the steel, which we had tied to the front foundation wall earlier, providing us with a solid connection point. We were careful to place the temporary braces in between the joist layout so we wouldn't need to move them when it came time to roll the joists into place.

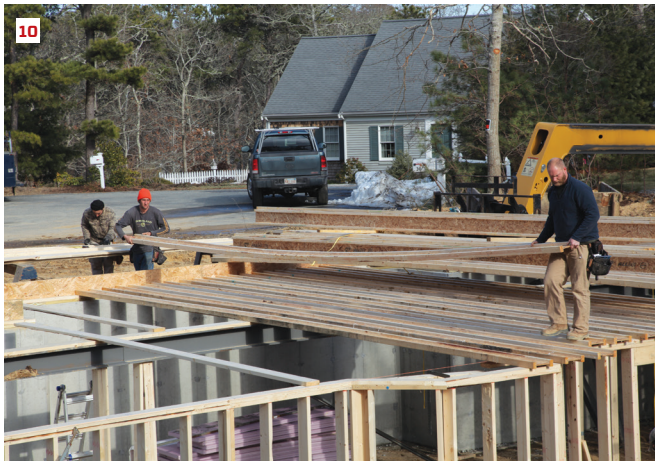
FIRST-FLOOR LAYOUT

We now have a consistent plate line at the first-floor level, so I lay out the front and back walls and then lay out the nailers on the steel. Just like with the basement wall layout, I mark out all of the openings—including stairs, fireplace, and plumbing drains—followed by the location of the structural beams. I finish the layout by marking the 16-inch on-center joist spacing.

This is where I made a mistake that cost the crew some time. I should have marked out all of my joists on the top plates of the walls prior to standing them, as well as on the nailer plates for the steel before installing those. If I had remembered to do that, I might have saved the crew at least half an hour.

ROLLING JOISTS

With the layout complete, we're ready for joists. The first step is to install the rim board along one side of the building—in this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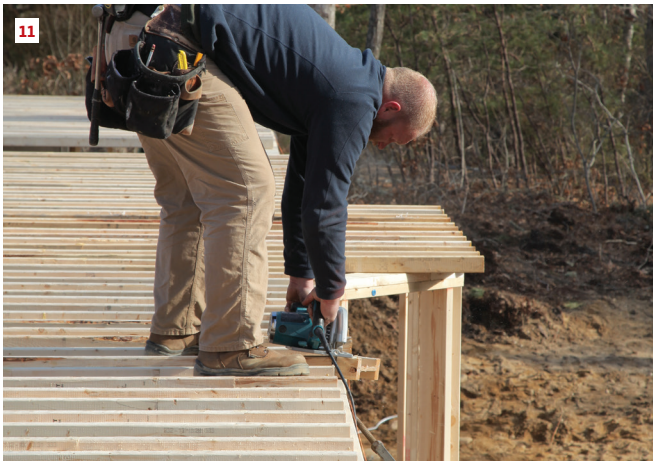
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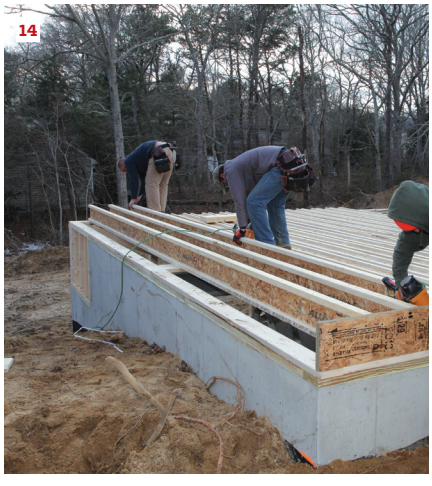
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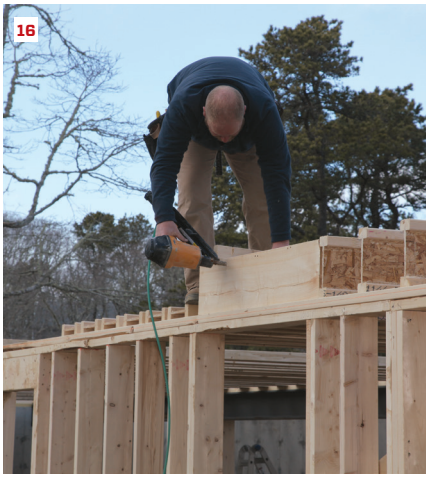
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case, along all the front walls of the house. We then load the telehandler with all of the I-joists and begin spreading them out, starting from the gable end and working outward. This has the advantage of giving us a safer surface to walk along as we go **(10)**.

As we spread out the joists on the plates, we put them tight to the rim board on the front sections and make sure that both ends are on their layouts. Because we have no anchor bolts in the foundation, the joists can sit flat and straight, which allows us to snap a clean line along the back of the house and cut all of the joists while they're laying flat **(11)**.

Once all of the joists are cut, we frame in the stair openings with LVL **(12, 13)**, after which one crew member cuts all the infill joists and another crew member cuts blocking so it will be ready to install as soon as as we've finished installing the joists. Three crew members begin rolling up the I-joists and nailing them off at our three attachment points **(14)**.

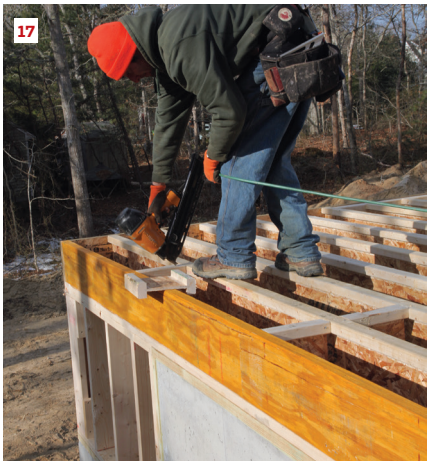
RIM BOARD & BLOCKING

For the rim running perpendicular to the joists, we typically install an engineered rim board material that's compatible with the I-joists, and on the load-bearing sides running parallel to the joists we install an equivalent size LVL **(15)**.

On the walkout side of this house, we didn't have enough head clearance for a regular header, so we installed a flush LVL header above the door in the basement wall **(16)**. While the rim was being installed, we also installed all of the necessary blocking. Blocking at 16-inch centers is required to support the exterior walls on the LVL sections of the rim **(17)**. Blocking and web stiffeners are also required for any intermediate load-bearing walls, which we had above our midspan girder.

SECURING THE SILLS

With all floor framing in place, it's time to permanently fasten the sill plates to the foundation. As described in the previous ar-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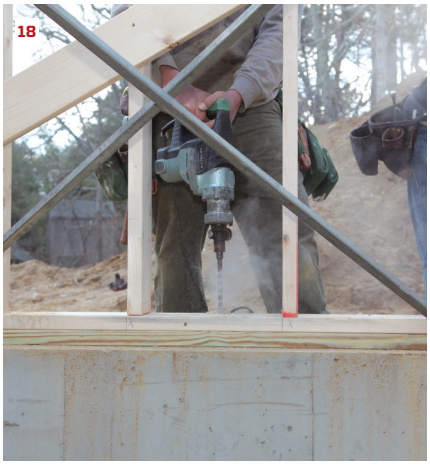
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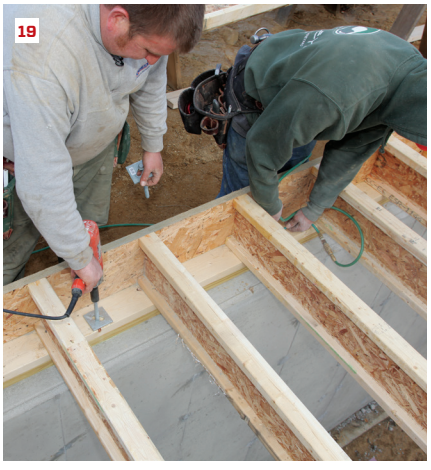
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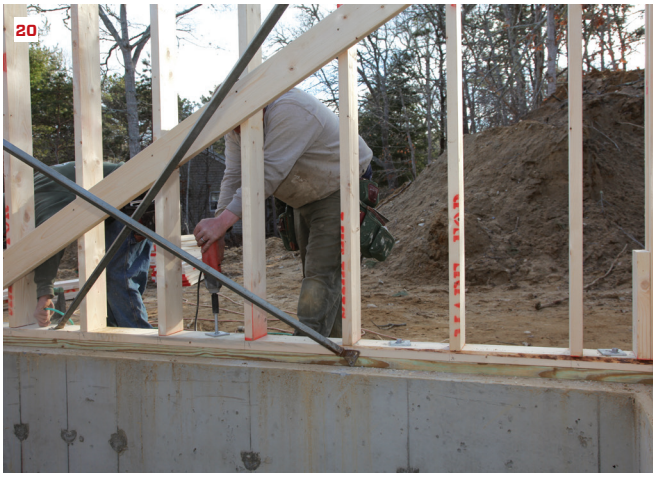
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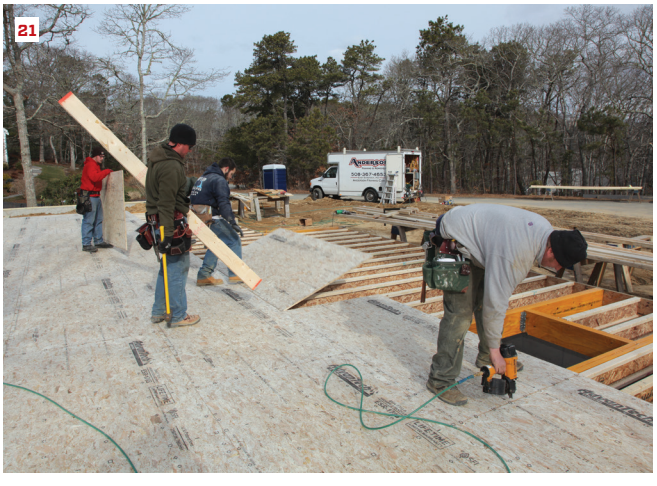
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ticle on prepping the foundation, we don't typically install j-bolts in the foundation. Instead, we opt for installing threaded concrete anchors after the deck is framed.

In 2008, when our building codes changed and the anchor spacing went from 6 feet to 24- or 32-inches on-center, we made the switch to drilling for threaded concrete anchors. With anchors spaced this closely, it takes considerable time to drill the sill plates to fit them over J-bolts, and we've often had to alter the joist layout to avoid the bolts. By using a threaded concrete anchor, we are able to install the anchors after the framing is in place, saving considerable time by placing bolts between the joist and stud layout exactly where we want them.

To install the anchors, one crew member drills the ⅝-inch-diameter holes through the sills and into the concrete **(18)**, and a second cleans out the hole using an air hose. A third crew member then drives the bolts with an electric impact wrench **(19, 20)**.

By the time all of the bolts had been installed, we had run out of daylight and it was time to wrap up for the day.

In the morning, we returned to install the subfloor across the deck. To save time, we deck right across the stair openings **(21).** We don't glue the rim joist, instead leaving the perimeter of the deck unnailed until we can come back and straighten the rim joists to the edge of the subfloor when we are snapping lines for our wall plates.

With the wall plates snapped out, we're now ready to start building walls. I had hoped to finish this deck in one day, but we lost time along the way, in part due to the layout error mentioned earlier. Any tips anyone has to offer for improving our productivity or quality are always welcome.

Matthew Anderson is the owner of Anderson Framing & Remodeling, a building company based in East Sandwich, Mass.