



The 4-Hour Deck

Modular sections built in the shop speed up assembly on site

by Kolbe Raiche

Where I work in North Dakota, composite materials are expected on spec-house decks because the harsh winters are tough on wood decking. Many potential homeowners don't want to have to stain or paint a deck, but composite decking is expensive, leading to a disconnect between the features buyers want on a new home and the price at which developers can turn a profit without decreasing demand. As a result, many developers end up installing wood decks, which, in our climate, often fail after five or six years from lack of maintenance. Since nearly 400 new homes are built in this area every year, I wanted to find a way to way to meet this untapped demand for cost-effective, low-maintenance decks.

Modular Construction

In the value triangle, three basic factors influence a purchase decision: cost,

quality, and convenience. A smart deck builder picks any two out of the three to compete on. In the solution my company settled on—modular deck construction—we optimize convenience and low cost.

This is *not* to say that our decks are low quality; they comply with building codes, and we employ best practices to build them. The way we save on costs is by omitting some custom details like picture-frame borders. As the photo above shows, the result is a design with exposed deck-board ends.

For our business plan to be successful, we must be available at short notice and able to install decks quickly. Many developers in our area are short-staffed and under tight schedule constraints while dealing with hundreds of subcontractors. Consistently providing a quick turn-around is the key to best serving this client base. With modular construc-

tion, our final design can be installed on site in about four hours.

Design

Design is the most important part of the process of building a modular deck; structural, aesthetic, and sizing problems are expensive to fix after installation. Sketch-Up is our 3D design tool of choice, helping us to make sure everything will be right the first time. It enables quick conceptualizing and fine custom detailing without the unnecessary frills of other deck design software that we've tried (**Figure 1**).

The idea behind modular decking is to build sections approximately 30 inches wide by the length of the deck; in this example, about 10 feet. This is about the maximum size that we can handle in our shop and load onto our trailer without machinery. On a standard deck framed with joists 16 inches on-center, each joist

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Detail Format: Structural Member (Code# Color)

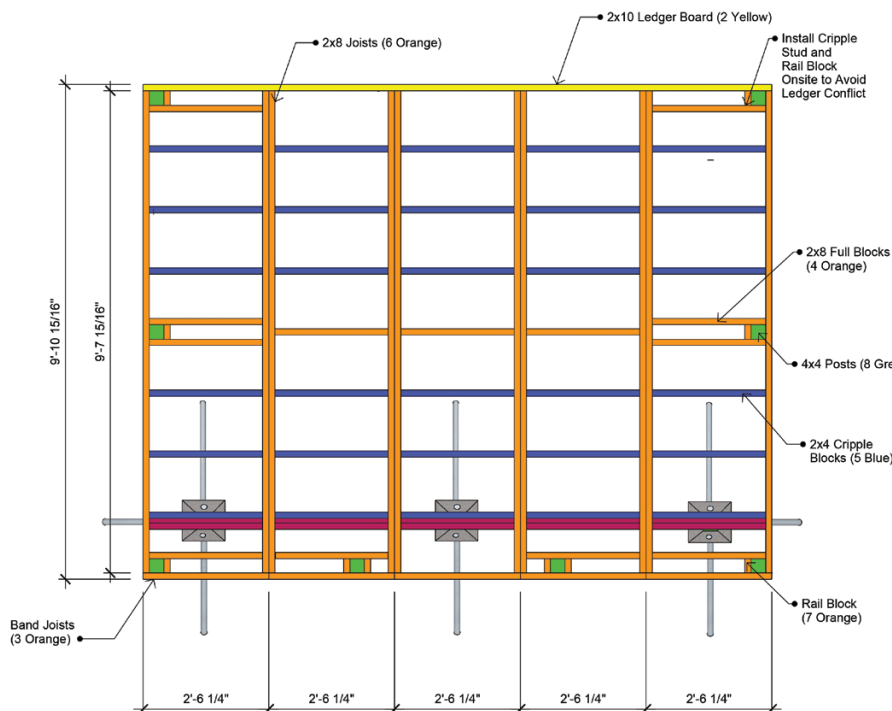


Figure 1. Here is a typical framing plan for a 10-by-13-foot modular deck, which the author designed using SketchUp. This design consists of 2-foot 6 1/4-inch-wide modules that are fabricated in the shop, then later assembled on site.

supports 16 inches of tributary area. In our framing plan, the two 2x8 joists that make up the long sides of each module can support up to 32 inches of combined area, so normal span tables still apply. On our modular decks, the supported area is completely inside each pair of joists that make up the long sides of each module.

As we assemble the sections, we install 2x4 blocking (to support the decking) and 2x8 blocking (for the railing posts). While this extra step uses more lumber versus building on site, the time and labor savings make it worthwhile, since decking and railing posts can be added to the modules before we transport them to the jobsite. Another advantage is that the extra 2x4 cross-blocking helps to stiffen the joists.

Assembly

We use the plan created in SketchUp to output a cut list for all the framing, deck-

ing, fascia, and railing, which allows us to precut all of the material prior to assembly. We invested in a pre-owned Tiger-Stop SawGear automated cross-cutting system to speed up this process, but this system isn't required. Any setup that ensures repetitive cuts are as accurate as possible would work.

In the shop. During assembly, we place the precut joists and blocking into a squaring jig, which allows us to quickly and accurately nail together the framing.

As we assemble the sections, we install 2x4 blocking 16 inches on-center between the 2x8 deck joists so we can run the deck boards parallel to the joists. At the same time, we install full 2x8 blocking where needed for railing posts. In some cases where there is a potential conflict, such as at the ledger, we hold off installing blocking until we are on site.

Once we've built the individual modules, we arrange them so that they are

aligned with each other as they would be on site, but not actually screwed together. Then we install the railing posts, followed by the decking.

Decking. We've found Trex Enhance Basics decking to be the least expensive and most readily available option in our area. We use Trex's clip system to fasten the decking to the framed sections, except for the first and last board on each module, which we face-fasten with screws on the outward side, because a clip would cause interference during installation.

Typically, we size each module to be the exact width of four or five deck boards and clips, plus 3/32 inch on each side to maintain the proper spacing at joints. If modules are not sized properly for the decking for some reason, we wait to install the deck boards over the joints until the modules have been installed on site.

After the decking is installed, the

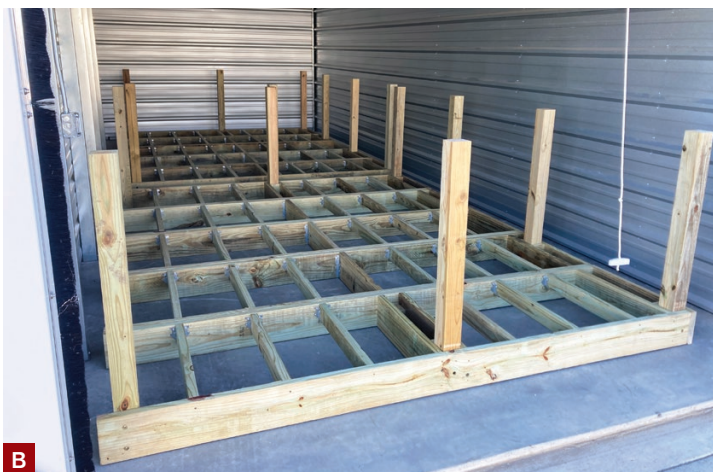


Figure 2. Parts needed to assemble the modules are precut using a TigerStop SawGear automated cutting system (A). Shown here are the modules needed for two decks, with blocking and railing posts installed (B). After the decking is attached to the framing with clips, modules are loaded onto a flatbed trailer for delivery to the site (C).

modules can be loaded onto a trailer and transported to the site. Each module weighs about 10 pounds per square foot; in this case, the modules weighed around 300 pounds each. We moved them by hand in the shop but used a rented Bobcat L28 articulated loader to move them on site. This machine works perfectly as it allows for very fine positioning. For longer modules, we would need a forklift to move them in the shop (**Figure 2**).

On site. Before the modules arrive on site, the ledger needs to be prepped and mounted to the house. Typically, the builder installs a dummy ledger with properly installed flashing before the siding contractor does their work. After siding is completed, we come in and replace the ledger and fasten it to the house framing with LedgerLoks. Our ledger has premounted double joist hangers to hang the modules.

We support the modular decks with Diamond Pier pin-pile footings, a code-compliant frost-protected system that doesn't require digging or pouring concrete. Each footing consists of a precast-concrete pier head that supports a deck post, and four steel pier pins that are driven at an angle through the pier head into the ground. We use 50-inch-long pins in our area, with each pier taking about 20 minutes to install. Larger decks sometimes require larger Diamond Piers or helical piers.

Once the ledger and Diamond Pier footings are installed, the crew installs posts, knee braces, and support beams. While we determine post heights with a laser level and then cut them to length on site, we are able to precut the knee braces in the shop. All beams are precut and nailed together in the shop so that we can simply set them in place during final assembly.

Finally, we use an articulating loader to set the modules into the joist hangers on one end while resting on the beam on the other end. Since each module acts as a kind of "mini deck" and doesn't depend on adjacent modules to support loads, we only need to use a few structural screws to join the modules together (**Figure 3**).

Economics

Training a new employee for shop work typically takes only about a week. Coming in with no experience, a worker can quickly learn how to build the modules, which produces profit for the company sooner. Of course, field workers require more

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training and experience to become proficient in equipment operation and proper ledger details.

Throughout the design and assembly phase, material lengths are optimized for cuts. This is possible on traditional sites but is easier and more effective in a controlled environment. The automated Tiger-Stop cross-cutting system that we've invested in for our miter saw saves around three hours of cutting per deck while producing consistently sized parts. We were able to find a 20-year-old pre-owned unit for about \$6,000. It has software to get the most out of the material on hand and can make suggestions based on material cost, length, and finished size.

Our approach also limits worker downtime, which can amount to a huge expense for traditional deck builders. In the shop, we've also implemented a pay-for-performance model, where employees are paid a base hourly rate and rewarded for completing work in less time. In our experience, pay-for-performance attracts highly effective employees who work hard. Full deck-sized jigs, automated cutting systems, and clear plans help cut down on production time significantly and give employees a clear vision to accomplish each day.

Along with those advantages, there are three challenges we have run into with this model. First, there is a limit to how complex the deck can become. Decks around pools or bounded by three walls or close to the ground are possible but require more customization and are therefore less profitable. In general, traditional construction makes more sense for more complex decks.

With the increase in overhead for the larger shop space, extra equipment, and machine rental, a lot of volume is needed to break even, not to mention make a profit. Modular construction would not make sense at a low volume.

Finally, many properties simply do not have enough access to the backyard to accommodate the modules. Narrow lots with fences, power lines, septic fields, and landscaping that is already in place all pose difficulties. Modular construction is not a solution for every deck, and there will always be a need for custom projects. But, for spec homes, apartments, and some homeowners, we've found that modular decks can provide a cost-effective, low-maintenance solution. ♦

Kolbe Raiche owns The Deck Dudes, a modular-deck building company in Bismarck, N.D. (thedeckdudesus.com).



Figure 3. The deck ledger is precut and fitted with double joist hangers off site (A). After the ledger is screwed to the house framing, the crew installs Diamond Pier pin-pile footings, support posts, and the preassembled beam and knee braces needed to support the modules. Workers then use an articulated loader to lift the modules into position (B). The partially completed deck shown here took 15 man hours in the shop and four man hours on site to install (C).