

A man in a light-colored long-sleeved shirt and khaki pants is standing on a green step ladder, working on the roof of a wooden pergola. He is using a power drill to secure a wooden beam. The pergola is made of light-colored wood and has a series of horizontal beams forming the roof. It is situated in a backyard with a house and trees in the background. The sky is clear and blue.

Build a Gateway Pergola

This cedar structure combines the look of traditional joinery with contemporary lines—all built with simple techniques

BY JUSTIN FINK

When my friend Brian started talking about building an outdoor structure to create a threshold between his short gravel parking area and the front yard of his house, it was clear that a large pergola would be the ideal solution. Set atop a timber retaining wall and flanked by plantings, the pergola would create an informal, open gateway.

But, like any other widely available, mass-produced outdoor structure, store-bought pergolas have begun to suffer from inelegant designs, subpar materials, and haphazard assembly methods that place a high value on convenience at the expense of durability. I

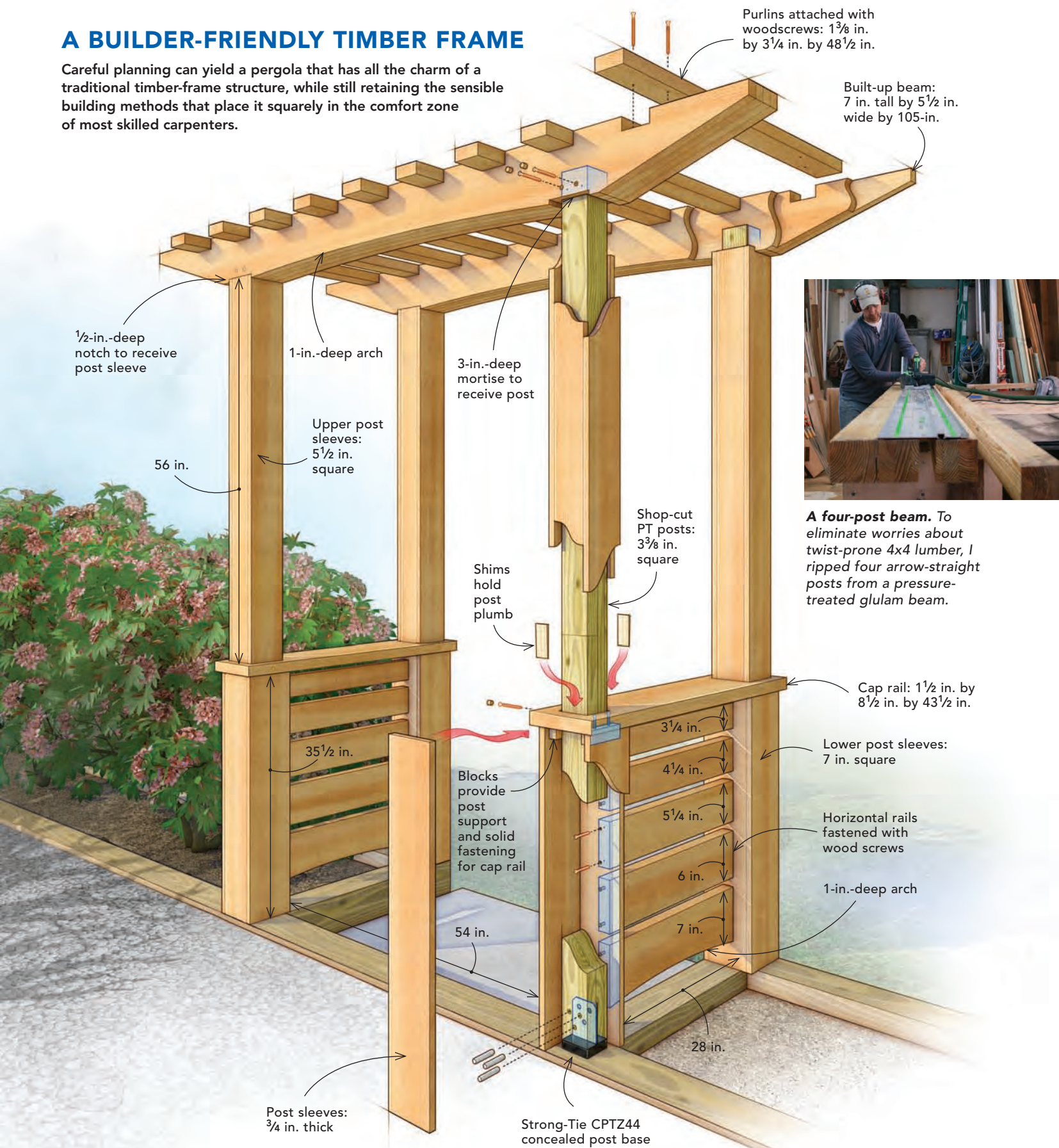
knew we could do better, so we set out to design a custom alternative. The design we came up with reflects Brian's contemporary, Asian-inspired taste, and could be built by anybody, regardless of whether they have access to the large timbers or specialized tools needed to erect a true timber-frame structure.

Start with a style in mind

The pergola would become the first thing seen and passed through on the way to the house, so it needed to mesh with the architectural style of the home, which had been remodeled to have a somewhat contem-

A BUILDER-FRIENDLY TIMBER FRAME

Careful planning can yield a pergola that has all the charm of a traditional timber-frame structure, while still retaining the sensible building methods that place it squarely in the comfort zone of most skilled carpenters.



A four-post beam. To eliminate worries about twist-prone 4x4 lumber, I ripped four arrow-straight posts from a pressure-treated glulam beam.

Explore the pergola in SketchUp
Download a full-scale SketchUp model of this pergola at FineHomebuilding.com/extras.



BUILT-UP BEAMS

Unlike solid 6x8 cedar, shop-laminated cedar beams allow the individual plies to be cut and curved without a large bandsaw or timber-framing tools.



The curve comes first. After aligning the 1/4-in. plywood router template to the top edge and centerpoint of the 2x beam ply, mark the curve and cut wide of the line with a jigsaw.



Tapers with a tracksaw. With the curve marked, lay out the rest of the beam with a framing square before cutting the tapers on either end of each ply with a track-guided circular saw.



Blunt the beam ends. After cutting all the tapers, remove the point of each beam ply. These cuts don't have to be exact, as they'll get cleaned up after the plies have been laminated.



Bearing-guided cleanup. After rough-cutting each 2x, realign and attach the template with double-stick carpet tape, then set the depth of a spiral-cutting, bearing-guided router bit to ride on the edge of the 1/4-in. plywood.



porary exterior—lap siding mixed with vertical siding, paint mixed with natural wood, and several levels of landscaping, hardscaping, and attached structures. The look leans towards an Asian aesthetic, which also happens to be the basis of the Arts and Crafts style. So, it made sense to build on this concept by including the look of traditional mortise and tenon joinery and clean, square edges. The contemporary feel came into play with the incorporation of some Asian design elements—subtle curves, recessed purlins, and crisp horizontal lines—which became a good opportunity to deal with crucial issues of

proportion. Because the space demanded a fairly large structure, we worked hard to keep it looking well rooted with a sleek, airy feel for the upper portion, flowing down to a substantial base.

Materials and methods that make sense

A conventional solution for building a post-and-beam-style pergola like this one would be to use—you guessed it—solid wood posts and beams. But solid timbers require traditional joinery, and that means lots of time spent on mortises. This wouldn't be a dealbreaker on



Rip the remainder. Set the tablesaw fence to a 7-in. rip cut to trim the excess from the bottom of each beam ply, creating flat spots where the posts will later meet each assembled beam.



Don't be shy with the glue. Spread a thick coat of exterior wood glue—as much for sealing the wood between pieces as it is for adhering them—across both mating surfaces before joining the pieces and securing them with screws every 4 in. around the perimeter.



Clamps assemble pairs. After the glue holding each pair of plies has set, back out the screws used to clamp the pieces, then glue and clamp pairs together with screw holes facing inward where they will not be seen.



Sand and shape. Don't fuss over perfect alignment during glue-up. Use 10 minutes and some 80 grit sandpaper for the inevitable task of blending and smoothing seams.

a simple four-post, two-beam pergola, but our design included five horizontal rails that would need to be mortised between pairs of posts, upper posts of different dimensions than the lower posts, and a wide cap rail on each side that would have to tie into the posts with through-mortises.

Although it didn't offer much cost savings (cedar is expensive no matter how you slice it), I set aside the idea of solid posts and beams and instead opted to laminate more commonly available 2x cedar to create the top beams, which I then set atop pressure-treated posts

wrapped in 1x cedar. This approach allowed me to install the rails faster, eliminated worries about tying the cap rails into the posts, simplified the required tools and the process of shaping the curved beams, and gave me complete control over the apparent width of the posts, which could now run uninterrupted from base to beam.

Choosing a material for the structural posts was a challenge, though. Any builder who has worked with pressure-treated 4x4s knows they are prone to twisting, and that movement would wreak havoc on this assembly. In an effort to find a stable, rot-resistant, affordable solu-

TIMBER-FRAME-STYLE JOINERY

With the help of some common power tools, you can add the feel of timber-frame joinery to the beams without too much traditional fuss.



Notches for post sleeves. Use a simple router template to guide a router collet and mortising bit, creating notches where the upper post sleeves will attach to the beams.



Forstner followed by a chisel. The fastest low-tech method for making deep mortises is to drill holes with a Forstner-style drill bit, then remove the waste with a chisel and mallet.



A dado for each purlin. After taping each side of the beam to prevent tearout, make a series of parallel, circular saw cuts to rough out a dado for each purlin, which are then quick and easy to knock free with a hammer or bend and break with a chisel or pry bar.



Bearing-guided cleanup. With the bulk of the waste out of the way, smooth the bottom of each dado with a bearing-guided bit, which rides along the shoulders of the cutout to get tight into the corners.

tion, I ordered a pressure-treated glulam beam from my lumberyard, which I then ripped into four arrow-straight posts that would be far less likely to twist.

The posts would be secured to the timber retaining wall via 4x4 post bases, but in order to ease this process I chose Simpson Strong-Tie CPTZ44 concealed post bases that use metal through-pins installed from one side rather than the traditional post bases that require nails or screws driven from two sides. This meant I could assemble most of the wrapped posts in the shop—leaving just one side off each post—

and I would still have all the access I'd need for securing the posts to the post bases.

Prefabrication and prep work

The tools required for building this pergola aren't exotic, so there's no reason the whole job can't be done right on site if desired. Personally, anytime I have the option to build a project in the shop versus doing the work on site, I choose the shop. Having my tools organized and close at hand means a faster, more efficient workflow. In this case it

HOLLOW ASSEMBLY CREATES A SUBSTANTIAL BASE

To beef up the appearance of the structural 4x4 shop-cut posts, I used wide, hollow post sleeves infilled with wide horizontal rails and a substantial cap rail.



Three-sided sleeves. Start the lower half of each side of the pergola by assembling the butt-jointed post-sleeves, which are left open on one side to allow access to attach the rails and, later, to secure the hidden 4x4 posts to their bases.



Keep the rails simple. Drive a pair of screws through the post sleeves into the endgrain of each horizontal rail to hold them tight, in line, and on layout, ensuring their position with a spacer board under the rails and a 1 $\frac{1}{4}$ -in. spacer block between each end.



Make way for the posts. Drill a $\frac{1}{2}$ -in. hole on either side of the cap rail to provide access for a jigsaw to make each square post-hole cutout without resorting to an awkward plunge cut.

Fasten the cap. After adding blocks to hold the posts steady in the oversized sleeves and to provide fastening for the cap-rail screws, add a spacer to ensure the open side of the sleeves are held to the right width before fastening from above where the screws will be hidden by the upper post sleeves.



was an added convenience, as I prefabricated as much of the pergola as I could on cold late-winter days in anticipation of an only slightly warmer early-spring installation.

The goal was to leave the shop with subassemblies of parts that could then be put together in place. I started with the top beams, which were the most labor-intensive part of the build. I laminated each of the two beams from four 2x8s that I individually rough-cut and then curved with a template-guided router before joining them together with a healthy coating of waterproof exterior wood glue.

Once the beams were glued up, I did the fit and finish work, including thoroughly sanding with both 80 grit and 100 grit sandpaper and creating pockets for post sleeves and mortises for the posts themselves as well as dadoes across the top of the beams to receive the purlins.

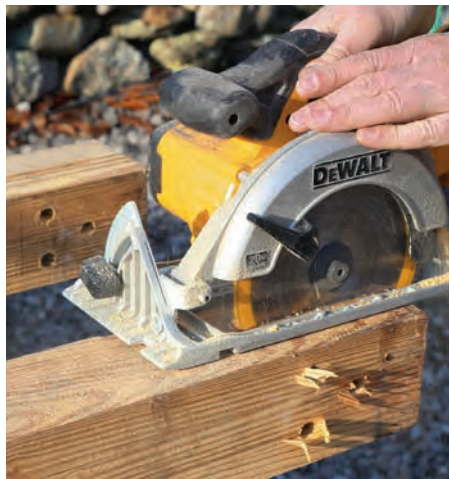
Everything below the beams and purlins can be broken down into a pair of lower halves and a pair of upper halves. The lower halves consist of wide post sleeves and horizontal rails, which are crowned with a hefty cap rail with jigsaw-cut square holes. These square holes allow the shop-cut 4x4 posts to slide into the lower assemblies and be

PREFAB PARTS ASSEMBLE EASILY ON SITE

If the shop portion goes as planned, you can arrive on site with two nearly complete lower assemblies, four posts and upper sleeves, two beams, a stack of purlins, and a fairly straightforward half-day of work.



Convenient template. Clamp the CPTZ44 post-base bracket to the post, using it as a template for boring the holes to receive the metal pins.



Easy kerfs. Make parallel passes with a circular saw on both sides of the post to create the $\frac{3}{16}$ -in. kerf necessary to receive the vertical fin of the base bracket.



Set the bases. Pan-head structural screws provide a quick connection between the post base and the timber retaining wall.



Pins for the win. Unlike conventional post bases, these allow the posts to be fastened from one side, so the lower assembly can already be in place.



Shim it plumb. Using a long level, plumb each post in both directions and hold them in place with shims. Cut the shims flush to prevent interference with the upper post sleeves.

attached to the post bases once on site. Then the upper post sleeves can be slid onto the posts before the beams are installed.

The on-site assembly work started with locating and setting the concealed post bases, being sure to orient each so that when the lower assemblies were later dropped into place there would be access for driving the metal pins through each post before fastening the final piece of cedar on the lower sleeve. With the lower assemblies and posts located and locked into their plumb positions, it was a matter of

hefting the beams up and onto the post tops, where structural screws make the permanent connection. The last step was to drop the purlins into their dados.

We chose to let the cedar fade to a natural gray, but a penetrating oil would also be a suitable, relatively low-maintenance finish. □

Justin Fink is editor. Photos by Brian Pontolilo, except where noted.



Sealed connection. After masking off the surrounding cap rail, apply a bead of marine adhesive sealant, then slide the upper post sleeve into place and tack it with finish nails.



Finish the base. Coat the edges of each remaining post sleeve, slide them into place, and fasten with finish nails.



Beams drop on. Apply sealant to the top of each post sleeve, then lower the beams into place and fasten them to the posts, bunging the holes for a clean, finished look.



Purlins come last. Tap each purlin into place and fasten with exterior wood screws, which are then covered with a smear of adhesive to protect against pooling water.