



A classic pergola

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A Classic



Pergola

by **David Radtke**

Create this low-maintenance outdoor retreat with treated lumber, composite columns and simple framing techniques

Here's a summer project designed to keep you cooler on even the hottest of days. The classical columns support an overhead wooden lattice that works like a big shade tree, letting only a portion of the sun's radiance shine through.

What looks like the toughest part of this project is actually the easiest—the graceful, solid-looking columns. They're not wood at all but a hollow-core composite material with amazing structural strength and durability. We've designed the project so you simply slip these columns over treated 4x4 posts embedded in concrete. When screwed to the wooden posts, these columns provide a stable, solid base for the overhead lattice framework.

These paintable precast columns are available by special order at home centers. They come in a wide variety of diameters and heights and architectural styles. Expect to pay about \$200 or more for each column. See the Buyer's Guide on p. 86.

Pressure-treated dimensional 2x8s and 2x10s make up the majority of the upper framework, and the decorative end pieces are cut with a jigsaw from our pattern. The whole project can be built in a couple of weekends, with another weekend for staining and painting. You'll spend about \$2,400, including the cost of the columns.

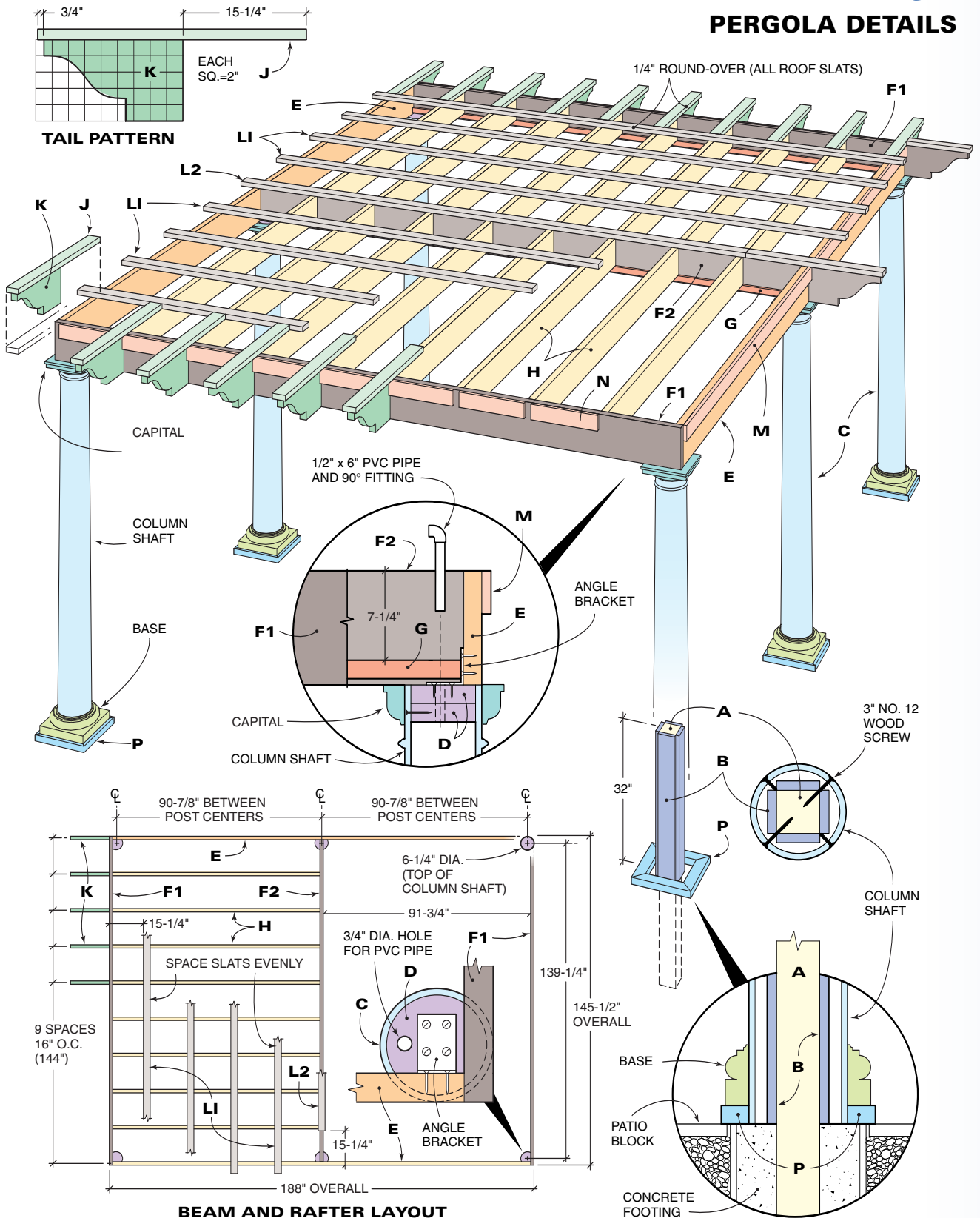
We built our pergola over an existing stone patio; that saved a lot of patio work. If you're planning to install a patio as part of your overall project, you'll need to allow extra time. For a list of articles about installing your own paver patio, see "For More Information," p. 86.

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FIG. A

PERGOLA DETAILS



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Shopping List

ITEM	QTY.
Pressure-treated 4x4 x 10' posts	3
Pressure-treated 1x4 x 8' post wraps	8
Pressure-treated 1x4 x 8' fascia	7
Composite polymer columns with bases and capitals	6
Pressure-treated 2x10 x 16' (E)	2
Pressure-treated 2x10 x 14' (F1)	2
Pressure-treated 2x10 x 12' (F2)	1
Pressure-treated 2x10 x 10' (decorative tails)	4
Pressure-treated 1x6 x 12' ledger strips (G), ripped to width	2
Pressure-treated 2x8 x 8' rafters	16
Pressure-treated 5/4 x 6 x 10' decking ripped to 3" (tail tops)	8
Pressure-treated 5/4 x 6 x 14' decking ripped to 3" (lattice)	9
Pressure-treated 2x4 x 10', ripped to 2-1/4" for subbase	3
60-lb. bags of dry mix concrete	30
Concrete forming tubes (2' lengths)	6
Construction adhesive	2 tubes
3" exterior screws (zinc plated) No. 12 size for posts	48
3" deck screws	5-lb. box
2-1/2" deck screws	5-lb. box
1/2" PVC pipe	6'
90-degree 1/2" PVC elbows	6
Stain and paint of your choice	
Auto body filler	
Simpson A21 steel angle	6

Cutting List

KEY	PCS.	SIZE & DESCRIPTION
A	6	3-1/2" x 3-1/2" x 56" treated posts
B	24	3/4" x 3-1/2" x 32" treated post shims
C	6	7-1/2" x 96" round columns
D	12	1-1/2" x 5-1/2" round discs (column inserts)
E	2	1-1/2" x 9-1/4" x 185" front and back beams
F1	2	1-1/2" x 9-1/4" x 145-1/2" side beams
F2	1	1-1/2" x 9-1/4" x 142-1/2" center beam
G	4	3/4" x 1-1/2" x 142-1/2" ledger strips
H	16	1-1/2" x 7-1/4" x 91-3/4" flat rafters
J	23	1-1/16" x 3" x 33" tail tops
K	23	1-1/2" x 9-1/4" x 17" decorative tails
L1	8	1-1/16" x 3" x 153" lattice strips
L2	1	1-1/16" x 3" x 134" center lattice strips*
M	4	3/4" x 3-1/2" x 91-3/4" fascia strips*
N	18	3/4" x 3-1/2" x 14-1/2" fascia strips
P	24	1-1/2" x 2-1/4" x 12-1/4" subbase (under molded base)

* Cut to fit



1 MEASURE the projection of your soffits and add 7 in. to accurately position the column centers near but not too close to the house. Drive remote stakes an equal distance from the house, attaching a string to help mark and align the outer post locations. (See text on p. 76 for more layout details.)

Choosing the right location

Because this project is made to stand independent of the house, you can either locate it right near your house as we did or let it stand alone in the garden. You can also consider using wood chips or gravel as a floor or even pour a concrete slab underneath. By keeping it unattached (about 4 in. from the eaves), you don't have to deal with moving existing gutters or matching eaves. You also don't have to mess with frost footings (in colder climates). However, if you have clay soil, it's best to dig to frost depth (if greater than 24 in.) for your footings to prevent frost heave.

Our existing patio was built over a sand and compacted gravel base, so we removed only the stones necessary to dig the 12-in. diameter holes to secure the posts. You'll most likely have a different situation. If you'll be adding a patio later, be sure to pour all the footings at the finished patio height. Keep in

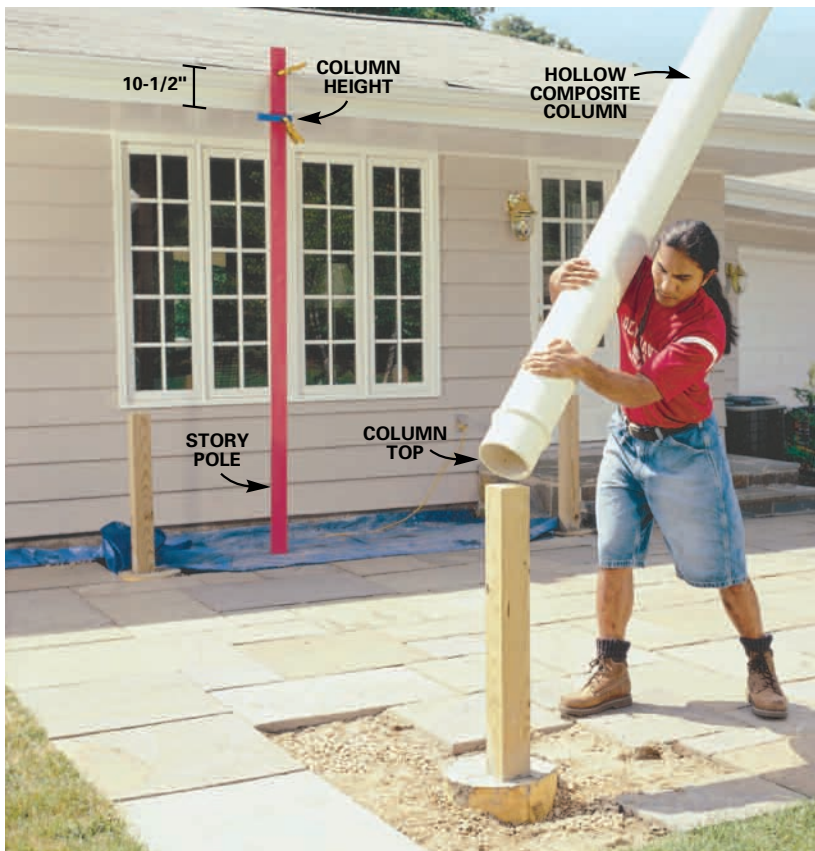


2 DIG the postholes a minimum of 2 ft. deep and 12 in. in diameter. Dig 24-in. tubes into the holes, add your 60-in. posts and pour concrete around them. Plumb your posts and align them with your outer string line. Allow the concrete to harden for a couple of days, then trim the posts to 32 in.

mind any slope you'll include in the patio. Most patios slope about 1/8 in. per foot to drain.

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Plan the post location to clear the eaves

If you plan to build your pergola close to the house, first measure the projection of your eaves as shown in **Photo 1**. Keep the center of the posts nearest the house at least 7 in. farther from the house than this measurement. To keep the posts in alignment, stake your post locations using remote stakes with a string. With the stakes driven beyond the work area (**Photo 2**), you'll be able to undo the string while you dig and then reattach it later to check for alignment. To check for left-to-right placement parallel to the house, just measure the distance from one of the remote stakes and write this measurement on a note pad. To make sure the layout is square, adjust the diagonal measurements of the postholes so they're equal.

As you dig your holes, put the soil in a wheelbarrow and find a place to relocate it away from your site. Save any gravel or sand to reinstall pavers. **Note:** You may need to move a post slightly. We shifted one post near the house to create an entry along the steps.



3 LIFT the columns (upside down) over the 4x4 posts to mark the bottoms for trimming. Attach a story pole to the house to establish a reference point.



Have your concrete delivered

Before you dig any holes, call your local utilities to mark any buried cable or gas lines. Once you're sure there are no buried utilities in the area, dig your holes with a hand-held posthole digger or rent a power auger. You'll also need a shovel to widen the hole. Dig until it's at least 24 in. deep. Reconnect your layout string to make sure the holes are aligned. Cut your forming tubes (**Photo 2**) and insert them into the holes. Level the tops of the forming tubes until they're flush with the patio surface. If you mix the concrete on

4 ATTACH a level to a straight 2x4 and mark the bottom of each post level with your height mark against the house. Remember, there's still 10-1/4 in. additional height going onto the tops of the posts.

5 TRANSFER your mark completely around the post using a combination square. Cut the post with a 10-teeth-per-inch wood blade in your jigsaw. You'll need a fresh blade for every post you cut.

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6 CUT 5-1/2 in. round treated wood plugs to fit the inside of your columns. Glue and screw together a pair for each column top, then glue the plugs flush into the top of each column. Secure the plugs to the columns with 2-in. deck screws. **Note:** Drive a screw into the top of each plug to use as a handle to position the plug.

7 SCREW 1x4 treated pine to the side of each 4x4. This will beef up the post so it meets the hollow column.



8 PREDRILL and countersink eight screw holes in the sides of the columns: four 6 in. from the bottom and four 30 in. from the bottom. Use 3-in. No. 12 exterior wood screws to anchor the columns to the wood posts. Plumb the column as you screw it to the post. You'll notice some play between the post and column. Opposing screws will tighten the entire assembly.

site, you'll need about five bags of Quikrete or Sakrete concrete mix per hole, for a total of 30 bags. (That's enough to have your home center or lumberyard deliver it to the site. If you call for a ready-mixed delivery, ask for 1/2 cubic yard.)

As you set your posts, reposition your string line about 1-3/4 in. to allow for the post thickness and then align the posts with your string line (**Photo 2**) as you pour in the concrete. **Note:** If you have a post that's 1/2 in. out of whack, don't sweat it. You'll be able to align the tops of the columns later when you install the overhead beam. Once the posts are embedded in concrete, let the concrete harden for a minimum of two days.

Cut the columns to length and fasten them to the posts

We wanted the roof of the pergola to align with the fascia of the house for a custom, fluid look. To keep the roof



of the pergola even and level across the whole topside, you'll need to cut each post exactly. Just clamp or nail a board temporarily to the fascia as shown in **Photo 4**. Measure down

10-1/2 in. from the top of your fascia board for the cutoff height of your columns (95 in. for ours).

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To make sure we cut the bottom only (we didn't want to have to wait another two weeks for a new column), we flipped the columns end for end, slipped them over the posts and marked the bottoms of each column—and numbered them as well.

Note: To make cutting the columns easier, lay them on sand bags or mulch bags to keep them from rolling or vibrating as you cut. Transfer your length mark completely around the column base with a combination square that's set from the bottom of the post.

I found the jigsaw a lot safer, quieter and less dusty than a circular saw. This composite polymer is only about 1/2 in. thick but pretty hard, so expect to eat up a new blade on each column.

Once you've cut each column, fatten the posts with 1x4s as shown in **Photo 7**. Predrill each column with a combination pilot and countersink bit (three holes 6 in. from the bottom and another three 30 in. from the bottom). Also drill four evenly spaced holes 1-1/4 in. from the top of each column to secure the plugs (**Photo 6**). Now slip each column over its post. Strap a level near the base of each column (the column begins to taper slightly after 32 in. from the bottom) and screw into the wood beneath. Tighten or loosen opposing pairs to "plumb up" each column. Next, slip the molded base over the top of the column and then slip the capital on as well. It's best not to fasten these in place until the project is nearly completed.



9 SLIDE the column bases and capitals over the column shafts. Measure and cut the outer 2x10 beam and walk it up the ladders.



10 SCREW the beam (E) to the wood plug so it's flush with the front outside edge of the column. Use angle brackets as shown with 1-1/4 in. Simpson bracket screws. Screw the other beam in place and then the other three intermediate beams, F1 and F2.

11 SCREW a treated wood 1x2 7-1/4 in. down from the top of each of the 2x10 beams running out from the house. These will act as ledgers for the 2x8 flat rafters.

Fasten the beams to the top of the columns

Measure the length of the front and back 2x10 beams (E), making them 3 in. less than the outside of the column tops, and cut them to length.

Note: If you have a column that won't quite straighten up, you can

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have someone push it straight up and down and then fasten it in place with the steel brackets from above.

Next, measure and cut the side beams (F1) and screw them to the ends of the front beams. Now cut the center beam (F2) 3 in. shorter than the side beams and fasten it to the posts and the front and back beams (E) with 3-in. deck screws.

Slip the flat rafters onto ledgers

Once all the 2x10 beams are in place, cut your 1x2 ledgers and screw them 1/2 in. up from the bottom of each beam F1 and F2 with 2-in. deck screws every 8 in. Now measure each 2x8 flat rafter (referred to as “flat” because they have no pitch) and cut it to length. Ideally these should all be the same length, but if you had problems with your post positioning earlier, you may have to adjust them.

Mark 16-in. centers along the beams F1 and F2. Rest each rafter on the ledgers (**Photo 12**) and screw them in place one at a time from the backside of each beam, aligning them with your marks. Where the rafters meet the center beam (F2), angle the 3-in. deck screws through the beam and into the rafter (**Photo 13**). When you’ve finished the rafters, secure each capital to the underside of the beams with 2-1/2 in. deck screws (**Photo 14**). Pre-drill the capitals.

12 SET the 2x8 flat rafters onto the ledgers (hold them perfectly vertical) and screw each end to the 2x10 beams with three 3-in. deck screws.



13 DRIVE screws at an angle to fasten opposing 2x8 flat rafters. Use three 3-in. screws per end.



14 PUSH the resin-cast capitals flush with the bottom of the 2x10 beams and screw them into place with 2-1/2 in. deck screws.



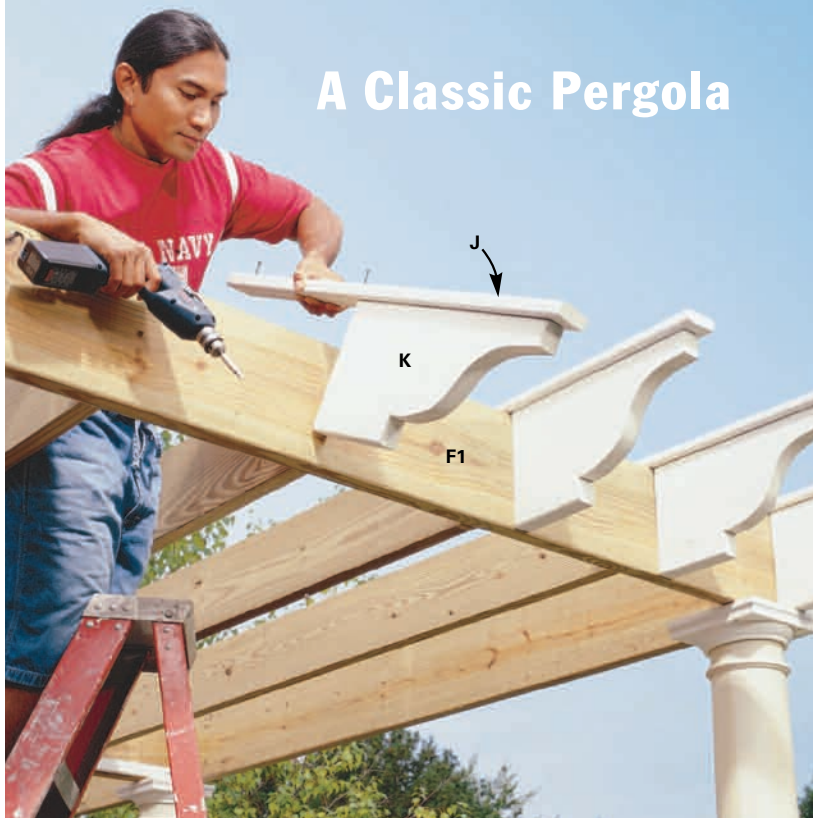
15 CUT the decorative rafter tails from treated 2x10 pine. To avoid cupping, choose knot-free boards and keep them out of the sun until you paint or stain them.

Preassemble the rafter tails

Cut the decorative rafter tails (J) using the grid template shown in **Fig. A**. For consistency, mark your first one as the pattern and trace this piece each time. Sand the gentle curves with a belt sander or portable drum sander.

Now cut the tail tops (K) from 5/4 decking. Round over the cut ends with a hand plane or a router (**Photo 17**). Ease the edges of the tails and the tops with 100-grit sandpaper

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16 **RIP** strips of 5/4 treated decking to 3-in. widths to make parts J. Align and screw them to K and to the top of each 2x8 flat rafter. Then screw K in place from the backside of F1.

and then apply a solid-color stain. Make sure the treated wood pieces are dry to the touch before you pre-stain them. If they feel cool, let them dry in a shady spot for two days before applying the solid-color stain. Rushing the process could cause the stain to blister or roll off.

Once the stain is dry, screw the tops to the tails with 2-1/2 in. deck screws (allow the top to overhang 3/4 in.) and fasten them over the tops of each flat rafter and beam end as shown in **Photo 16** and **Fig. A**. You'll need to cut the tail top short on the assemblies that project from the corners and screw them in place from the backside of the front beam.

The last details

Cut and nail (8d galvanized finish nails) the 1x4 fascia strips (M) flush to the top of the beams and in

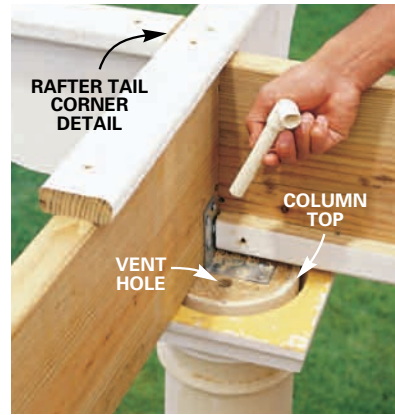
between each pair of tails (**Photo 20**). Next, screw the lattice strips across the rafter tops, letting them project 3 in. past the fascia.

Now cut the subbase pieces from treated 2x4. Screw the corners together with 3-in. deck screws. If you haven't already done so, fit the patio stones back against the footings and glue the subbase to the patio surface. Then screw the molded base to the subbase and caulk the seams with acrylic caulk.

Before you paint the columns, mix auto body filler and spread it over the screw holes along the column (**Photo 19**). Let the filler dry and then sand it flush. Prime the columns, and then paint them with a good-quality exterior trim paint. Don't use paint on the rest of the pergola; instead roll and brush the wood portions with solid-color stain.



17 **RIP** 5/4 decking 3 in. wide and rout a 1/4-in. round-over on each edge to make the lattice strips.



18 **DRILL** 3/4-in. holes and insert 6-in. long 1/2-in. PVC pieces with 90-degree fittings attached. These little pipes act as ventilators to help slough off any excess moisture that may get into the columns.

19 **FILL** the pilot holes and screwheads on each column with auto body fiberglass filler. Let the filler harden, then sand the areas flush. Now you're ready to paint.

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20 **SCREW** the 5/4 lattice strips to the tops of the rafters. Evenly space them across each section. Add more if you'd like to increase the shade below.

Buyer's Guide

You can find a supplier in your area for composite polymer columns by calling HB & G at (800) 264-4424 or visiting www.hbgcolumns.com.

For More Information

- "Stone Path," March '01, p. 38.
- "Brick and Stone Patio," April '00, p. 34.
- "Raised Stone Patio," June '99, p. 30.

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