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PROJECT PLAN



Outdoor living room

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Outdoor Living Room

Unique sandwich construction achieves the massive look of solid beams with half the effort

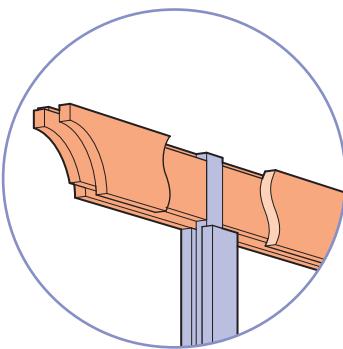
by **Travis Larson**

There's nothing quite like kicking back on your own patio—until the sun starts cooking you or the rain begins to fall. But you can easily double your time in the great outdoors with this beautiful pavilion. Just think—no more rainouts during your next barbecue!

And with a roof, you can relax on dry, clean, comfortable, padded furniture, which just can't stand up to the elements on an open patio. All in all, you can give your patio the feel and function of an outdoor living room. But the best part is, this pavilion will add real beauty and value to your home by dressing up that lonely, underused space.

OK—it's pretty, but can I build it and how much?

While this design may look complicated to the novice carpenter, don't be intimidated. If you have the basic hand power tools, can handle a circular saw and have a bit of remodeling experience, you have the moxie to pull off this project. We'll show you some scribe-it, nail-it-up and cut-it-in-place techniques that greatly simplify the tough spots and speed up the project. In fact, another



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1 ASSEMBLE a rectangular template to mark the outer perimeter of the posts and beams. Use the dimensions from your plan and tack together 2x6s and a 2x8 ridge board. Square the template using the 6-8-10 squaring method shown. Nail 2x4s across the corners to keep the template square.

carpenter and I built the basic structure in three leisurely days and spent a fourth day finishing the decorative column skirts. Give yourself and a helper about twice as long and you may finish faster than you think.

Besides a carpenter's apron outfitted with the basic hand tools, all you need are a 4-ft. level, a circular saw, a jigsaw and posthole digging tools. But consider renting a power nailer for a day (\$45) to save time and effort for the massive job of nailing down the roof decking.

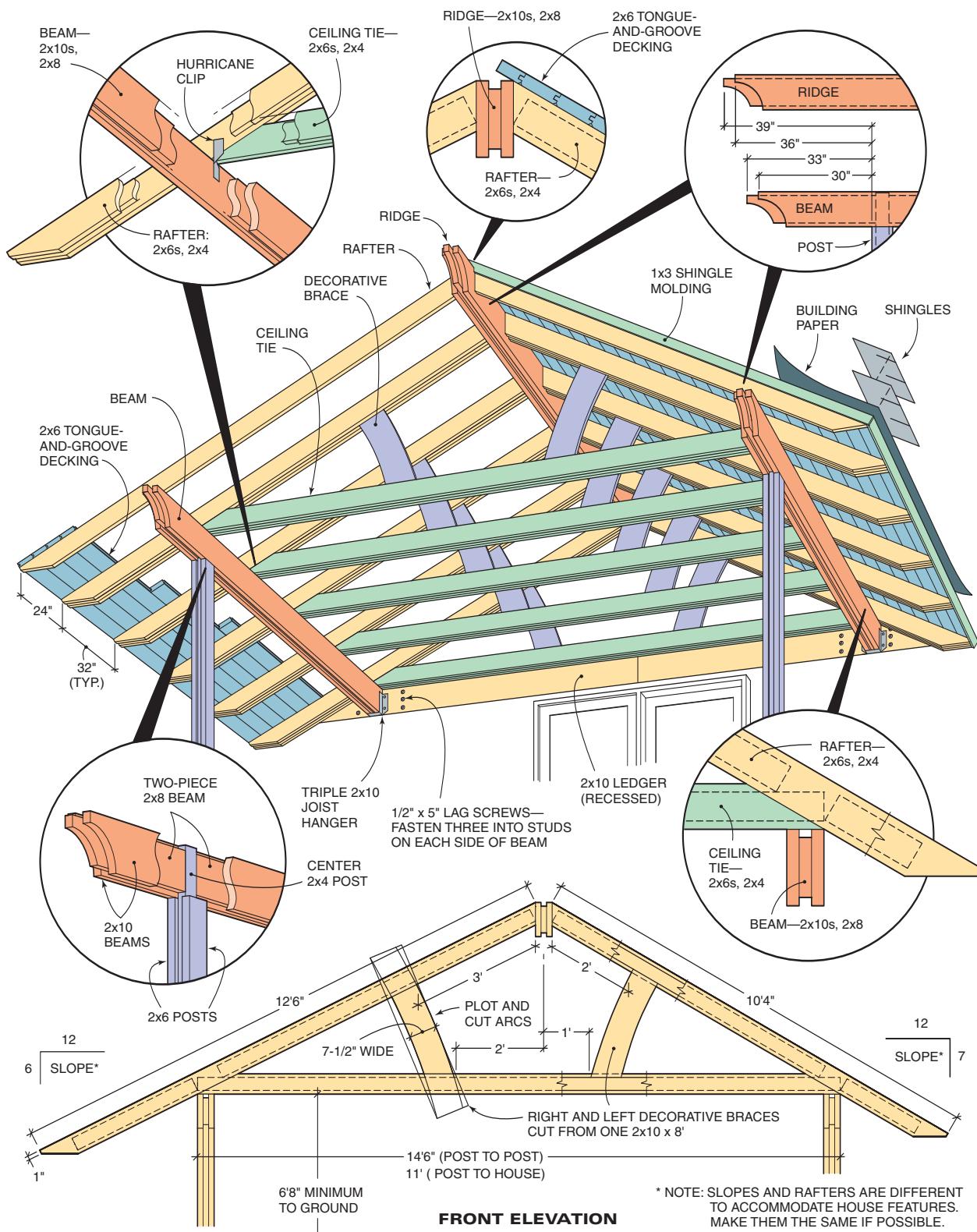
Comparing the before and after photos, you can see that in addition to building the pavilion, we did some major stonework and planting. Those improvements aside, our total materials bill came to about \$3,500.

Sandwich framing and 2x6 tongue-and-groove decking construction

The design of this roof resembles traditional post-and-beam construction, but without the headaches of working with heavy, expensive timber and the tricky joinery that goes with it. The posts, beams, rafters and ceiling ties (see **Figs. A and B**) are built-in-place sandwiches of common 2x4, 2x6, 2x8 and 2x10 smooth cedar lumber. The center board of each sandwich is 2 in. narrower than the outer ones, which lends attractive shadow lines and architectural "heft" to the building.

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FIG. A ROOF ASSEMBLY



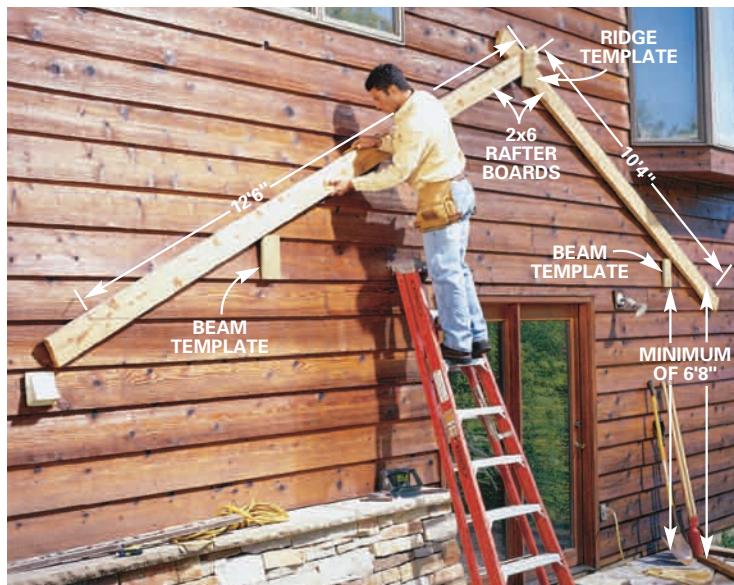
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This triple-thick assembly method makes the framing members very strong, which allows for longer spans and wider spacing between members. This technique allows you to overlap and lock all the pieces together for a very strong framework, easier nailing and tighter joints. And, by assembling beams in layers, they're lighter to lift. Since the rafters are so beefy, you can space them 32 in. apart. But those wide spans call for a roof decking that can handle those spans. Tongue-and-groove 2x6 decking (**Photo 18**) fills the bill nicely because it's very strong, reasonably priced and easy to install. It also looks great on the inside. You can let butt ends of the roof decking fall randomly throughout the roof; it's not important that they splice over framing members. But the seams will look more polished if you use a block plane to carve a little chamfer on decking ends where two boards meet.

This flexible design is easy to customize

We give the basic measurements for the structure in **Fig. A**, but don't treat them as a cutting list, because you'll most likely have to adjust them to fit your own home. Adjusting sizes is easy. First you get the beams

Text continued on p. 44



2 **MOCK UP** the roof framing against the wall. Cut three 4-1/2 x 9-1/4 in. plywood rectangles to simulate the beams and ridge and use 2x6 rafter stock to lay out the rafters. Position the beam templates by drawing vertical lines on the siding with a 4-ft. level and a straight 2x4, using the perimeter template as a guide (**Photo 1**). Measure halfway between the templates and draw a vertical line to mark the center of the roof. Tack each 2x6 rafter to the siding with a couple of 16d nails crossing at the centerline. Tack the ridge template at the point where the rafters cross, keeping the top two corners even with the rafter tops.



3 **DIG** 12-in. diameter footing holes to frost depth and pour 6-in. concrete footings in the bottom (**Fig. B**, p. 54). Then reposition the perimeter template precisely and recheck squareness. Nail the lower post assemblies together with 16d hot-dipped galvanized nails spaced every 4 in. Drop them onto the concrete footings and toenail the assemblies to the template corners. Then plumb and brace the posts in both directions and backfill the holes, packing the soil every few inches.

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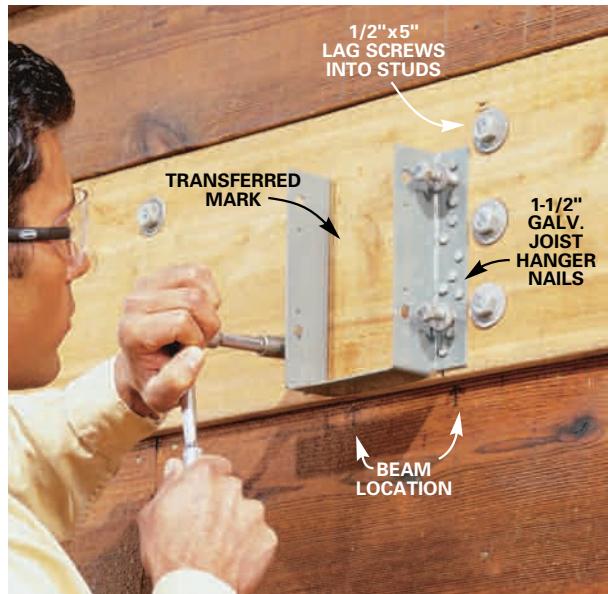
4 **CUT** and assemble two lower and upper slip forms (used for post trim later; Fig. B, p. 54), then slip them over the posts and let them rest on the patio.



5 **TRACE** around the beam templates and the bottom of the ridge templates (Photo 2) and pull them free. Mark the tops and ends of the rafters and remove them. Snap chalk lines 3 in. above the rafters to allow space for the decking and step flashing (Photo 20). Set the circular saw to cut just through the thickest part of the siding and cut out the 3-in. wide strip, leaving the sheathing intact.



6 **SNAP** chalk lines between the tops and bottoms of the two beams and cut the ledger recess through the siding and sheathing. Cut one end of a 10-ft. 2x10 ledger to match the roof angle, hold it in place, and mark and cut it at the center point. Nail the ledger in place with two 16d galvanized casing nails into each wall stud, *except for the studs on each side of the joist hanger position*. Repeat for the other ledger half.



7 **BOLT** the ledger into the studs on each side of each joist hanger location with three evenly spaced 1/2 x 5-in. lag screws with washers. Nail triple 2x10 joist hangers to the ledger at each beam location with 1-1/2 in. galvanized joist hanger nails, then screw through the large hanger holes with 1/2 x 2-in. lag screws. (First drill 3/8-in. pilot holes for all lag screws.)

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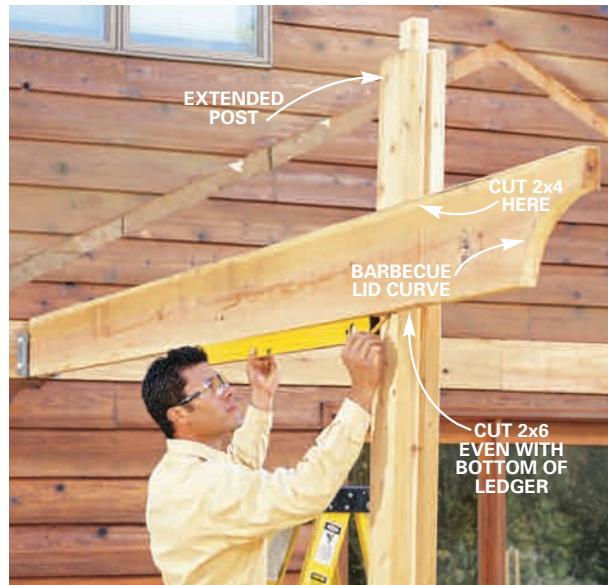
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and posts laid out and in position, then you simply measure or scribe the rest of the elements for exact lengths or angles before cutting them to length and installing the parts. On your site, you may need to widen or deepen the structure to miss windows or doors on the house or bridge over existing patios.

You can "grow" the length or width of the roof as much as 2 ft. without

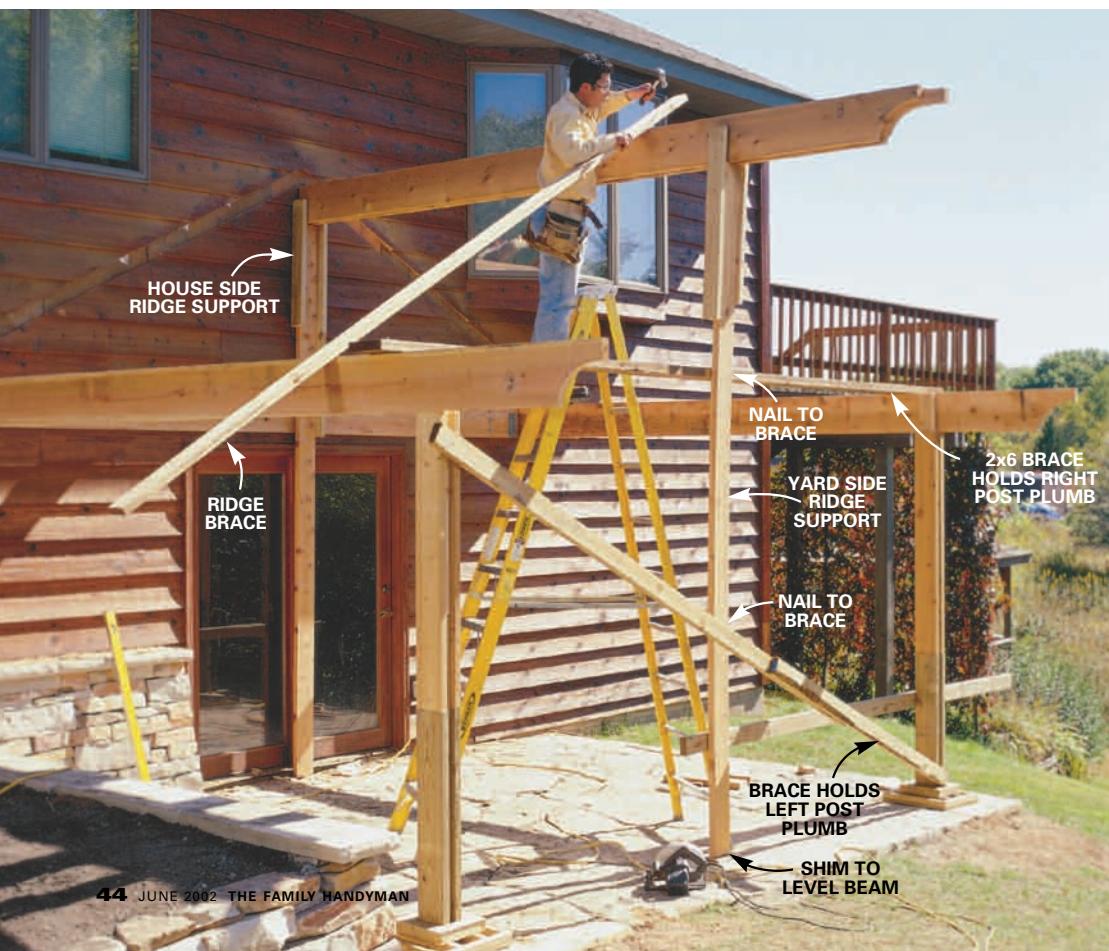
Tip
A barbecue lid works great for drawing the arc on the end of the beams.

compromising structural integrity and shrink it as much as you want. The roof lines can also be altered to miss wall obstructions. We had to steepen the roof slope on one side to miss the bay window you see in **Photo 2**, p. 38. Under that window, the roof has a 7/12 slope (7 in. of vertical drop for every 12 in. of horizontal distance), while the other side has a 6/12 slope. At a minimum, you should try to have a 4/12 slope if you live in a snowy area. Ask your building inspector for minimum slopes for your area when you pick up the building permit. But remember that steeper pitches may call for longer rafters and more decking. You can figure out required material lengths when you go through the layout exercise we show in **Photos 1 and 2**.



8 EXTEND the posts with 2x4 and 2x6 cedar so that they project beyond the top of the ledger, nailing every 4 in. with 16d casing nails up to the beam height. Cut a 2x10 beam member to length and shape the end. Rest it in the joist hanger, level it and mark the height on the post. Cut *only* the post 2x6s at that height with your circular saw. Cut the center 2x4 9 in. higher (Fig. A).

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9 NAIL the outer 2x10 beams into the post's center 2x4 with three 10d galvanized box nails and into the joist hanger with 1-1/2 in. joist hanger nails. Plumb and brace the posts as shown. Center and nail the two temporary ridge supports, one to the house and the other to the post braces. (See "Bracing as You Build," p. 52.) Cut, place and tack each ridge member in position atop the ridge supports, then recheck the ridge for level and center. Brace the ridge with a couple of 2x4s nailed to the ridge and each beam. Nail the ridge members together from both sides with 10d galvanized box nails.

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10 **CUT** an approximate 25-degree angle on the first 2x6 rafter and hold it in place against the ridge. Use a 2x4 to scribe the exact angle on the rafter. Use the rafter as a pattern to cut all the 2x6 rafters for that side. Repeat the process on the other side of the ridge.



Tip Sight down the beams to make sure they're straight before installing the rafters. Straighten if necessary and hold them in place with braces until the rafters are on.

11 **LAY OUT** the rafter positions on the beams and ridge as shown in Fig. A and toenail the rafters into the ridge with three 16d galvanized nails (where they'll be hidden by the middle board of the "sandwich"). Nail hurricane tie-down straps to the middle side of the rafters and to the inside of the beams with 1-1/2 in. galvanized joist hanger nails.

Selecting the wood

We used smooth dimensional cedar for all of the exposed framing for this pavilion. However, we decided on stained spruce tongue-and-groove 2x6s for the roof decking because cedar decking cost nearly twice as much. You can save about \$500 by using standard framing material for the entire structure—a smart move if you intend to paint or stain everything to match the house.

Even though the structural elements are exposed, you don't need *flawless* lumber for your pavilion for a clean, handsome look. Simply select the lumber with the best faces for the edges and sides that will show. We had all the lumber delivered (in other words, we just got random picks from the lumberyard) and had no problem finding enough good-looking sides and edges. If you're dissatisfied with the look of any of the lumber, you can always exchange it.



12 CENTER and nail the two-piece middle 2x8 beam members to the 2x10s with alternating 10d nails spaced every 8 in. Then nail up the inner 2x10s with the same nailing pattern.

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13 PUSH the 2x6 ceiling ties against the rafters and scribe the end cuts to match the underside of the rafters. Number them to avoid confusion. Cut a second 2x6 ceiling tie for each rafter using the ones you scribed as patterns for their mates. Tack one under each rafter with a 10d toenail and save their mates for the other side of the sandwich later.

Lay it out on the ground and house before digging the footings

The easy way to determine the shape and slope of your roof is to first lay out the "footprint" of the posts and beams using the dimensions we give you (**Photo 1**). Then use a 4-ft. level and a straight board to draw the beam locations on the walls. The height of the bottom of the beams should be at least 6 ft. 8 in. for "head-banging" clearance (**Photo 2**). Tack 4-1/2 x 9-1/4 in. beam templates cut from plywood to the wall to simulate beams. Then lay out the roof lines with two 2x6s tacked through the siding to be sure:

- The rafter tails have a minimum of 6 ft. 8 in. of head clearance.
- The roof has at least a 4/12 slope.
- The windows, bays or other wall projections are spaced at least 5 in. above the rafters to leave room for flashing.

This is the time to make final adjustments to the roof slope and the post-and-beam locations. If everything seems OK, you can start digging your footings.

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14 CUT the middle 2x4 ceiling tie boards so they're flush with the outside of the beams. Nail them to the rafters and the 2x6 ceiling ties with 10d nails spaced every 12 in. along each edge. Cut the 2x4 rafter center boards as shown here and in Fig. A and nail them to the center of the 2x6 rafters. Cut the center 2x4 rafter tails so they're just short of the horizontal level cut.

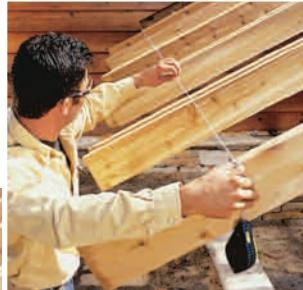


15 CUT two 4-ft. lengths of 2x10 and tack them between the 2x4 rafter and ceiling tie parts to lay out the curved decorative braces (our positions vary because of the differing roof slopes). Mark the lengths at the 2x4s. Bend and clamp a thin board and trace arcs about 7-1/2 in. apart on both sides. Cut them with a circular saw and jigsaw and nail them into place.

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16 **NAIL** on the previously cut 2x6 rafters and 2x6 ceiling ties to the 2x4s to complete the rafter and tie sandwiches. Place 10d casing nails every 12 in. Toenail the rafters to the ridge beam.



Foundation-grade posts and floating base skirts

Use .60 foundation-grade treated 2x4s and 2x6s for the lower post sections and the footings (**Fig. B**, p. 54). You may have to special-order them, but the added longevity is worth the money and trouble. For the above-ground base skirt framing and sheathing, standard .40 treated material will work just fine.

The base skirts are designed to “float,” that is, slide up and down the fixed posts that they encase. That’s especially important when they rest on a slab or stone surface in cold regions where frost can lift patios when the ground freezes. The skirts can move up and down during freeze/thaw cycles, but the posts, which extend below frost depth, stay put—without lifting the entire structure. So when you frame and trim the pilaster base skirts, make sure everything fits loosely.

If the posts have to penetrate a concrete or stone surface, cut a 20-in. square hole for digging the footings (**Photo 3**). Use a circular saw with a diamond blade and don’t worry about making it pretty; the skirt will cover the hole. To prevent settling, just be sure to pack the soil well as you backfill around the posts.

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17 **TRANSFER** the rafter tail length from the house rafter to the outermost rafter and snap a chalk line to that mark. Draw the 1-in. end cut with a square and the level cut on both sides of each rafter using a 2- or 4-ft. level. Make the rafter tail square cuts first with the circular saw, then make the horizontal level cuts.



18 LAY the first course of tongue-and-groove roof decking with the groove side facing downhill flush with the rafter ends. Nail the roof decking into one rafter of each rafter pair with two 10d nails. Select lengths so butt seams fall randomly throughout the ceiling. Halfway to the peak, check to make sure the boards are running parallel to the ridge beam. If they're not, adjust the next few courses slightly to fix the problem. Snap a chalk line flush with the edge of the fascia board and cut off the decking ends with a circular saw.

Bracing as you build

We show a fail-safe method of positioning your posts so they're square and spaced perfectly from the house and each other. The trick is to use a jig made from the framing materials (called a "footprint template" in **Photo 1**). Initially tack the posts to the jig (**Photo 3, inset**) and then later to each other (**Photo 9**). Constantly check the posts throughout the construction to keep everything square and plumb and you'll make your life easier as you assemble the upper parts.

The ridge assembly is especially tricky to center and support before the rafters are in place. Use the rafter mockup (**Photo 2**) to determine the height of the bottom of the ridge and tack a temporary 2x6 support against the house to support that end of the ridge (**Photo 9**). The temporary brace that supports the yard end of the ridge will most likely be taller to accommodate any drainage slope on the patio. Cut that support a few inches longer,

tack it in place and use a long, straight board and level from the top of the house-mounted support to mark the length. Then cut it to length and use existing and additional supports to hold it in place before you set the ridge. A couple of 2x4s nailed to the outside and a couple of braces will keep the ridge from slipping off the support while you're installing the rafters. We assembled the ridge sandwich on the ground and lifted it into place, but it was a struggle for the two of us! It'd be much easier to lift the boards separately and nail them together once they're up.

After the ridge is assembled, measure from the ridge edges to the beams on each wall. To center the ridge perfectly, adjust the ridge until the right and left measurements are the same. Note that if you have to build an offset roof as we did, the ridge will no longer be exactly centered, but you still have to make it parallel to the beams.

Materials List

Item	Qty.
LUMBER	
Premixed concrete (footings)	4 bags
.60 foundation-grade treated wood, 8' 2x6s (posts)	2
.60 foundation-grade treated wood, 6' 2x4s (posts)	2
.40 ground-contact treated wood, 8' 2x4s (pilaster framing)	3
.40 ground-contact treated wood, 4x8 sheets of 3/4" plywood (pilaster framing)	3
.40 ground-contact treated wood, 10' 2x2s (pilaster framing)	4
8' cedar 2x6s (posts)	2
10' cedar 2x4s (posts)	1
14' cedar 2x10s (beams)	4
14' cedar 2x8s (beams)	2
10' cedar 2x10s (house ledger)	2
16' cedar 2x10s (ridge beam)	2
16' cedar 2x8 (ridge beam)	1
12' cedar 2x6s (rafters)	11
12' cedar 2x4s (rafters)	5
14' cedar 2x6s (rafters)	11
14' cedar 2x4s (rafters)	5
16' cedar 2x6s (ceiling ties)	10
16' cedar 2x4s (ceiling ties)	5
14' cedar 1x3s (shingle molding)	3
12' cedar 1x3 (shingle molding)	1
8' cedar 2x10s (decorative braces)	5
12' cedar 2x6s (pilaster base trim)	2
12' cedar 2x4s (pilaster base trim)	2
8' cedar 2x10s (pilaster top cap)	2
8' cedar 2x2s (pilaster top collar)	2
8' cedar 1x3s (pilaster trim strip)	2
Random-length 2x6 tongue-and-groove spruce, pine or fir (roof decking)	750 lin. ft.
HARDWARE	
10d galvanized box nails (framing)	3 lbs.
7d galvanized box nails (shingle molding)	1 lb.
10d sinkers (roof decking)	10 lbs.
5/16" staples (roof felt)	1 box
1-1/4" roofing nails (roof shingles)	10 lbs.
4d galvanized box nails (pilaster shingles)	1 lb.
10d casing nails (pilaster trim)	1 lb.
2,700-lb. rated USP JT (triple joist hanger)	2
1/2" x 2" lag screws (hanger fastenings)	8
1/2" x 5" lag screws (ledger to house connection)	12
4-1/2" USP RT 7 (hurricane tie for beam to rafter connection)	10
1-1/2" joist hanger nails (hurricane ties)	Small box
5" x 7" shingle tins (step flashing)	1 bundle
ROOFING	
15-lb. roofing felt (shingle underlayment)	1 roll
Asphalt shingles (roofing)	3-2/3 squares
Ridge shingles (roof ridge)	1 bundle
Cedar shingles (pilaster shingles)	3 bundles



19 **NAIL** the shingle molding onto the eave edge flush with the top of the decking with 7d nails into the rafters and the decking. Notch the gable-end shingle molding around the ridge and nail it to the fascia. Cut the end of the gable shingle molding flush with the eave molding with a handsaw.

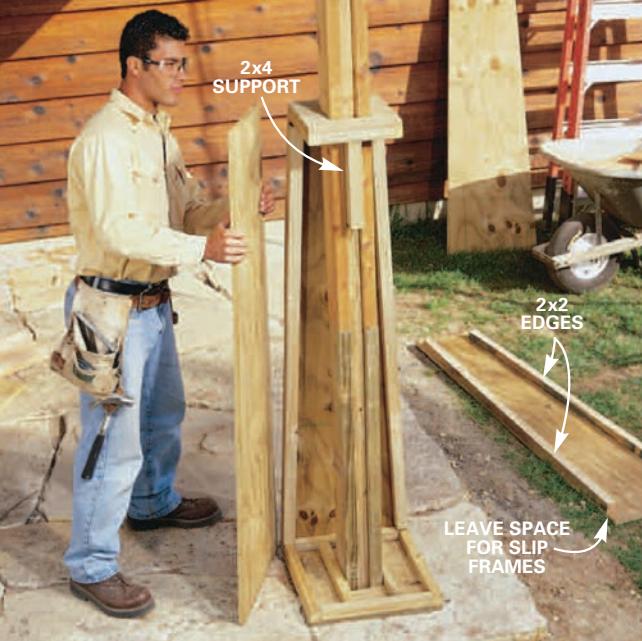
Tip

It's easiest to slide the step flashing up from the bottom edge of the last piece of siding.



20 **STAPLE** roofing felt onto the decking and shingle the roof following the manufacturer's instructions on the wrappers. Bend and tuck 5 x 7-in. shingle tins under the siding and over the top half of each shingle for every course against the house.

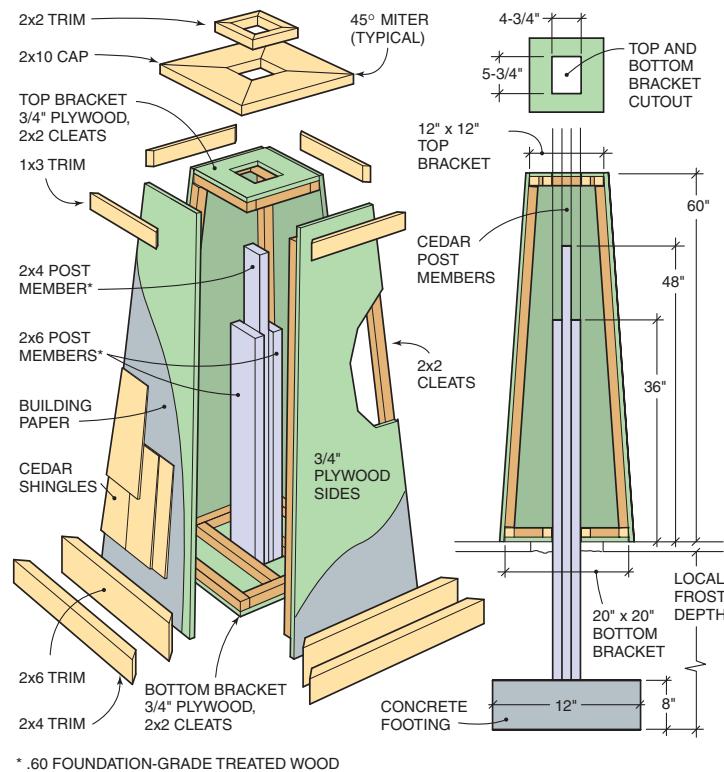
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21 CUT and assemble the tapered plywood post-base sides using Fig. B as a guide. Raise the top slip frame 5 ft. above the floor and hold it in place with a 2x4 block toenailed into the post. Nail the side pieces to the top and bottom slip frames and to the 2x2s with 7d galvanized nails spaced every 6 in.

Tip The cedar base trim will last longer and look better over time if you hold it an inch or so above patios to keep the wood dry.

FIG. B PILASTER ASSEMBLY



* .60 FOUNDATION-GRADE TREATED WOOD



22 SHINGLE the pilasters by alternating over-laps at each course and corner. Using a pencil, lightly draw level lines about 8 in. up from the bottom of the course below for straight shingle guidelines. Hold each shingle plumb and scribe angles on the backside of the shingle.

Finishing

Whichever wood types you decide on, think ahead and prefinish the wood whenever possible—especially if the roof decking sports a different finish than the framing. We put two coats of exterior latex stain on the decking before installing it. That saved tons of time over painstakingly cutting in cleanly around the framing. For the same reason, it pays to apply an exterior sealer on the cedar after the structure is up and before installing the decking. If you're staining or painting standard framing lumber, we suggest applying the finish before erecting the structure and then touching up nail holes and end cuts after construction. You'll get a better, faster paint job and the wood surfaces that are buried inside sandwiches will be better protected from moisture.



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