



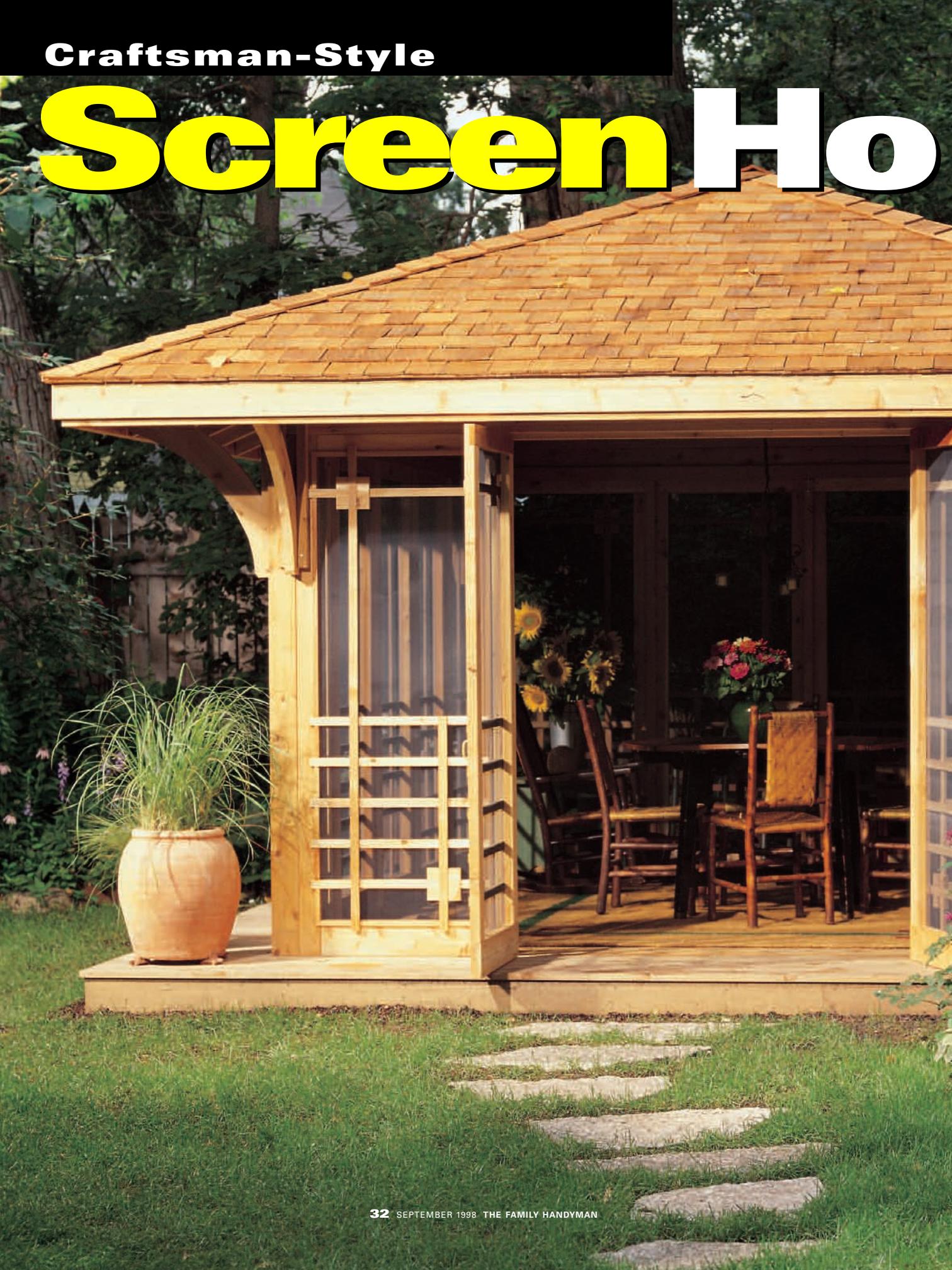
# Craftsman-style screen house

**This article originally appeared in The Family Handyman magazine. For subscription information, visit [www.familyhandyman.com](http://www.familyhandyman.com)**

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**Craftsman-Style**

# **Screen Ho**



# use

The perfect outdoor retreat.



by **David Radtke**

**W**hen I was a kid, my mom and dad would pack us into the station wagon and head up to the North Woods for a whole week to beat the city heat. We always stayed in cabin No. 10, tucked between two mammoth white pines. The cabin wasn't much: a little kitchen, a tiny bedroom and a modest sitting room. The screened-in front porch was bigger than all the other rooms put together.

Although we did a lot of fishing and rock skipping outdoors, we spent the bulk of the week on that porch, playing checkers, hearts and old maid; reading comic books; and of course, sleeping. Even though the porch had see-through screened walls from floor to ceiling, it felt cozy.

That porch was the inspiration for this Craftsman-style screen house. It's big enough for two families to while away the best of days in. The warm glow, and the fresh scent of cedar, plus the detailed doors and a gorgeous 1x6 cedar board ceiling, make the inside of this screen house as inviting as its outside.



## TIME, TOOLS AND COST

A project like this requires a fair amount of carpentry experience. If you've built a wooden yard shed, a complex deck or an intricate fence, you'll have the confidence to tackle this project. It'll also take a huge chunk of time, so plan to take a couple of weeks off work along with a few dedicated weekends (now is the time to call in all those favors from friends you've helped over the years).

You'll need basic carpentry tools for this job, with additional help from a table saw and router. You'll need a couple of stepladders for this project as well; I recommend a 6-ft. and a 12-ft. I also rented a section of 6-ft. scaffolding for about \$30 a day to help with the roofing. Figure on spending about \$3,500 for materials (see Cutting List, p. 50) and get as much delivered to your home as possible.

## PLANNING

This is not a small-scale project. At its longest points (the roof overhang) it measures just over 18 ft. long and 15-1/2 ft. wide. Keep these numbers in mind as you look for a place to nestle your structure. We shoehorned our screen house into the back yard of an average-size city lot and crowding the existing fence and surrounding trees. This nestling effect made it look as if the screen house grew into its surroundings.

Before you do any digging, call local utilities (gas, electrical, phone, cable) to locate any buried lines. Also make some plans to get rid of the extra dirt and sod you'll dig up. We ended up with about 1-1/2 cu. yds. to haul away.

Our porch is built over a hefty foundation of 6x6 preservative-treated pine timbers sunk in a crushed-rock base. Upright timber posts at each corner are notched and lag-bolted to the buried timbers. Each post is also lag-screwed to 2x6 treated joists. The joists hold the posts firmly in place and provide a decay-resistant framework to elevate the cedar decking above ground level. The spectacular open rafter roof is supported by cedar headers bolted to the posts and by

stationary doors fastened to the corners. The curved corner brackets not only provide elegant detailing to each corner, but act as reinforced structural bracing (whatever you do, don't eliminate them).

Making the finely detailed doors is simplified by building a jig to hold the door parts square for accurate and foolproof assembly. The same jig also holds the door securely for stretching the screen, stapling it to the frame and then applying the decorative door moldings.

### Fig. A Overall Details

SEE FIG. D FOR ROOF FRAMING

SEE FIG. F FOR EAVE DETAILS

SEE FIG. E FOR RAFTER DETAILS

SEE FIG. C FOR FOUNDATION PLAN

INSTALL THROW-BOLTS AT TOP AND BOTTOM OF DOORSTOP P7

NOTE: Building codes in some regions require additional seismic and high-wind anchors. Ask your building inspector about local requirements.

### Fig. B Completed View

SEE FIG. H FOR CORNER DETAILS

SEE FIG. G FOR DOOR ASSEMBLY



1

**LEVEL** the 6x6 treated beams (A) over a trough of gravel. The gravel helps drain excess water and provides a stable bed for the foundation. Spread gravel along each beam, leaving only about 1 in. of the beam exposed.

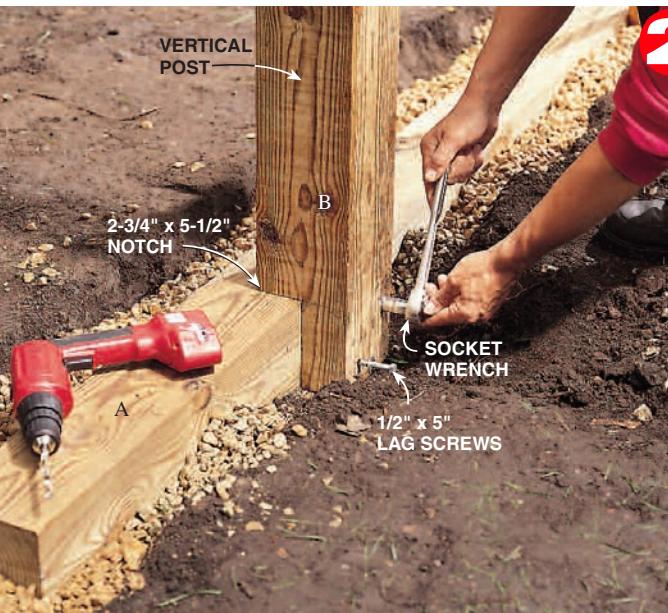
## THE FOUNDATION

Once you've staked out your perimeter on well-drained level ground (see **Fig. C** for the foundation dimensions), you'll need to dig trenches for the 6x6 treated beams (A). (Be sure they're .60 treated, rated for underground protection. Special-order them if necessary.) Follow the foundation plan in **Fig. C** for the correct placement. Dig each trench about 10 in. deep and 12 in. wide. Fill each trench with about 5 in. of crushed rock (we used crushed limestone because it packs well).

Now cut the beams to length and lay them in the trench (**Photo 1**). Level them with each other and make sure the diagonal measurements from the ends of the two outer beams are equal. This ensures that the foundation will have square corners. The beams should sit proud of the surrounding grade about an inch so the joists that lie over them can clear the soil. Once the beams are in place, pour crushed rock around them to lock them into position.

The next phase involves setting the posts (B) onto the beams. First, cut them to length and notch the bottom as shown in **Photo 2**. Measure in from the ends of the outer beams (A) as shown in **Fig. C**. Get a helper to hold the notched end of the post perfectly vertical (plumb) on the beam and aligned with the mark. Drill two 3/8-in. pilot holes through the post and into the beam. Now insert your lag screws (1/2 x 5 in.) and washers and tighten them (**Photo 2**). Repeat this for each post. **TIP:** If you're working alone, you can tack each post into position with nails and 2x4 braces.

Now you can lay in the joists as shown in **Photo 3** and **Fig. C**. The joists that connect to the posts must be cut and blocked as shown in **Fig. C**. You can cut and block each pair of remaining joists, or you can overlap 10-ft. joists on the center beam. Just be sure the joists that butt against the posts are



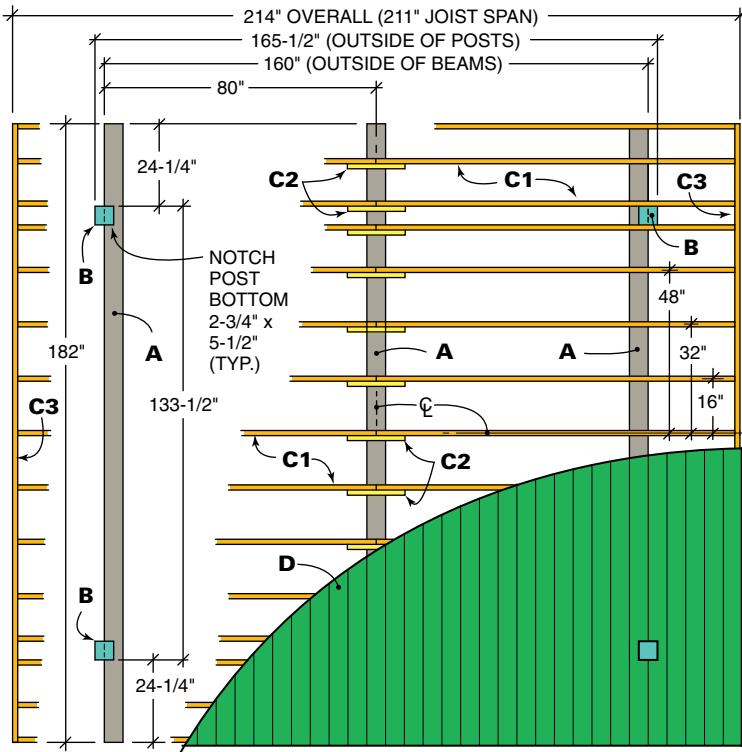
2

**FASTEN** the notched upright posts (B) to the outer foundation beams (A) with 1/2-in. x 5-in. galvanized lag screws and washers. Be sure to plumb and brace the posts as you drill a 3/8-in. pilot hole for each lag screw.

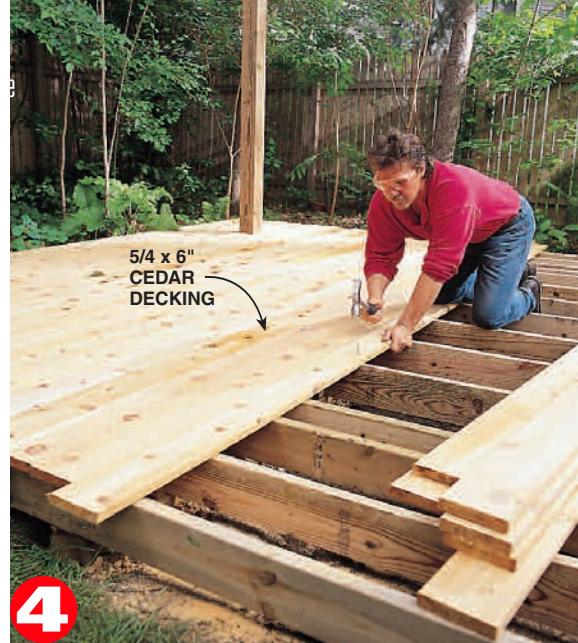


3

**INSTALL** the joists at each end first, then string a line between them. Align the ends of the other joists 3/4 in. from the string (use a spacer block on each end joist as shown; see "For More Information," p. 50). Then tack them in place, mark them and join them with blocks. The joists that butt against the posts must be lag-screwed to the sides of the posts to keep them from racking out of alignment.



**Fig. C Foundation Plan**



**NAIL** the 5/4 x 5-1/2 in. decking (D) to the tops of the joists with 10d finish nails. If your decking feels moist when you're nailing it, butt the sides tight. If the decking feels dry, leave a 1/16-in. space between the boards for expansion during wet weather.

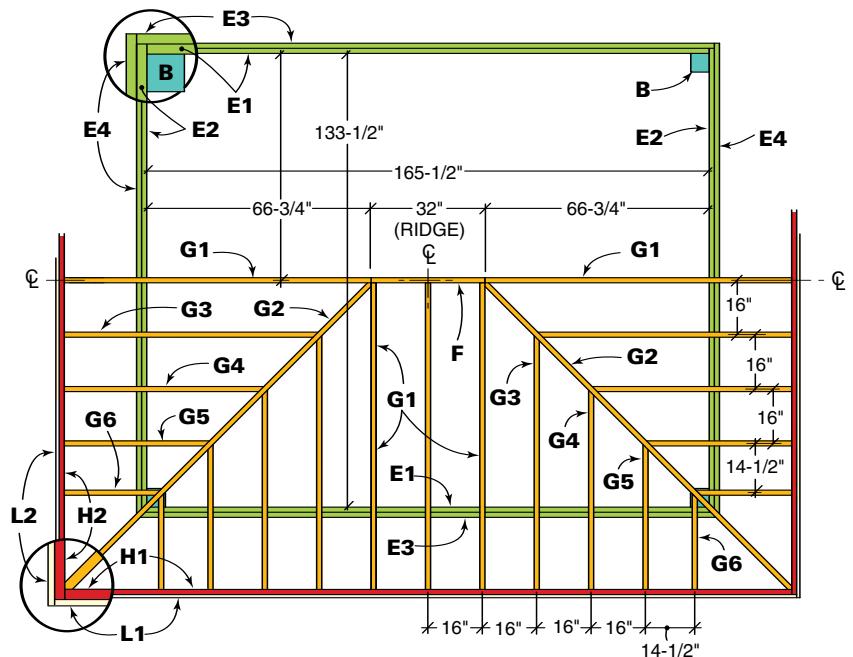
screwed to the posts with 1/2 x 3-1/2 in. lag screws, and all the joists are toenailed with three 16d galvanized nails where they overlap each foundation beam.

To finish off the foundation, nail the five-quarter (5/4) decking (D) to the joists with 10d galvanized casing nails.

## HEADERS

The upper headers (E1, E2, E3 and E4) fastened from post to post (Fig. D) are the main support for the roof. The stationary doors that fit later under the lower headers (M1 and M2) help support the roof as well.

When you install the inner headers (E1 and E2), be sure your posts are plumb and that the distance from post to post is identical at the top and bottom of the posts. Lag-screw (1/2 x 3-1/2 in.) the inner headers to the posts as shown in Photo 5, then nail the outer headers over the inner headers with a pair of 10d galvanized nails every 16 in.



**Fig. D Roof Framing**

## THE RAFTERS

Think of these supports as a structural skeleton to hold the roof skin in place. Our roof has three basic types of rafters: common, hip and jack. Pick your lumber for the rafters carefully because they'll be visible when the project is finished.

The **common rafters (Photo 6)** are all the same length and have the same miter cut at the top and the same "bird's-mouth" or notch cut near the bottom. Cut them to the dimensions in **Fig. E** and nail them to the ridge board (F). Support the ridge board temporarily with a 12-ft. 2x6 toe-nailed to the decking and to the ridge itself. The top of the ridge should be roughly 123 in. up from the decking (you may need to raise or lower it slightly for a tight fit for the miter cuts on the rafters). Once you like the fit, fasten all the common rafters to the ridge board with 16d galvanized nails. Nail the rafters through the ridge from the back to hide the nailheads.

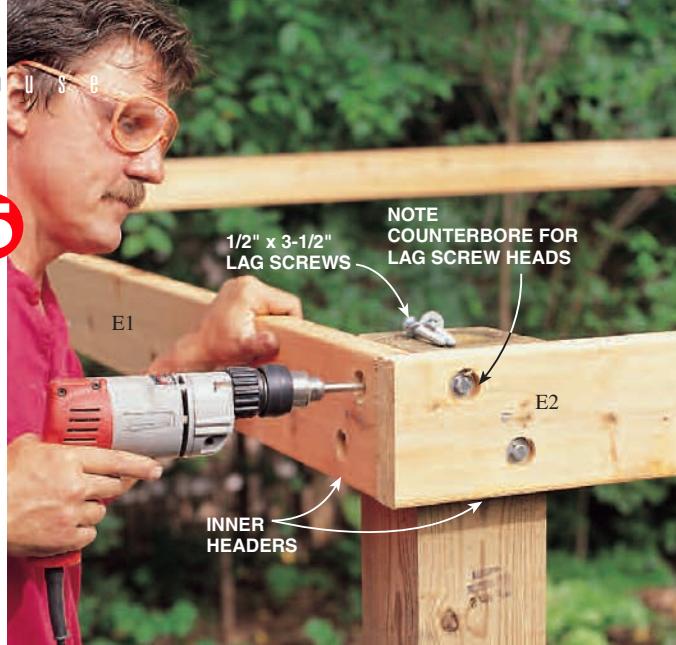
The four **hip rafters (Photo 8)** rest over each corner and meet the ends of the ridge board. You'll notice that the upper miter is a compound cut. This miter angle differs from that of the common rafters (**Fig. E**), and you'll notice it has a 45-degree bevel cut on each side along with the miter cut. This allows the hip rafters to fit snugly between the common rafters. The bird's-mouth notch is also unusual because it sits at an angle to the common rafters. You can leave a bit of extra length at the overhang of each hip rafter and trim it to final length once the other rafters are in place.

The **jack rafters (Photo 8 and Fig. E)** rest on the header just like the common rafters and have the same degree measurement at the top. However, the edge of the jack rafter has a 45-degree bevel (a cheek cut) so it fits tight against the hip rafter. Toenail

*Continued on p. 43*

**SCREW** the inner headers (E1 and E2) flush with the top of the posts. Drill a 1/2-in. deep recess with a 1-1/4 in. spade bit, then a 1/2-in. dia. clearance hole for the lag screws. Be sure to drill a 3/8-in. pilot hole into the post.

5



**INSTALL** the common rafters (G1) first. These rafters are all identical and get nailed to the ridge (F) above and to the headers below. Temporarily support the ridge with a long 2x6 nailed to the decking and to the ridge.

6



**CUT** the compound angles for the hip and jack rafters. Remember that opposite hips and jacks are mirror images of each other.

7





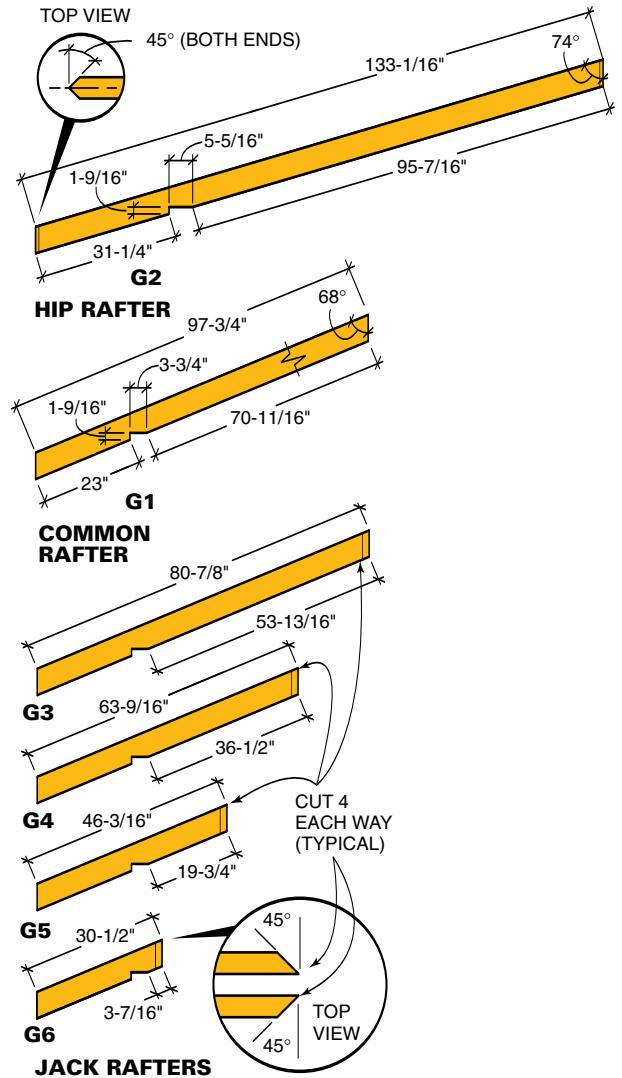
**8** **NAIL** the jack rafters to the hip rafters (8d galvanized) and to the header below (16d galvanized). Sight all the tails to make sure they're aligned. Trim slightly if necessary.

*Continued from p. 39*

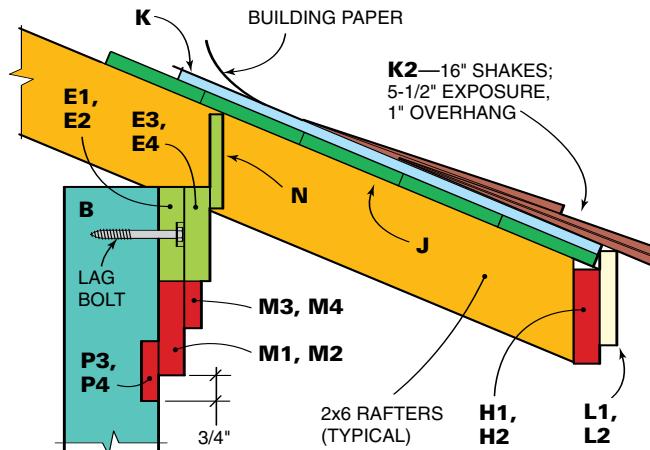
each of these cheek cuts to the side of the hip with three 8d galvanized nails. Note that the cheek cuts (**Fig. E**) on each side of the hip rafter are mirror images of each other.

When you're finished installing the rafters, nail the subfascia (H1, H2) to the tails of the rafters and install the 2x6 lower headers (M1, M2) directly beneath the upper headers. Also nail (8d galvanized casing) the 5/4 header trim (M3, M4) to finish off the transition between the upper headers and the lower header.

**TIP:** Before you set the roof boards over the rafters, nail temporary 2x4 braces on two sides of the structure, from the middle of the header diagonally to the bottom of the post. This will minimize any racking during the building process.



**Fig. E Rafter Details**



**Fig. F Eave Details**



9

**NAIL** the 1x6 cedar roof boards (J) to the tops of the rafters after installing the subfascia (H1 and H2) over the exposed ends of the rafter tails. Leave a 1/8-in. space between the boards and alternate end joints so they don't all fall on the same rafter. We used a combination of 12-ft. and 8-ft. long boards. Finish opposite sides first, then trim the board ends to length all at once (set your circular saw at a 15-degree bevel).



10

**INSTALL** the 5/8-in. CDX plywood over the top of the 1x6 cedar roof boards. Use 10d nails to secure the plywood through the roof boards to the rafters. Leave a 1/8-in. gap between plywood panels to allow for weather changes.



11

**INSTALL** the shingles over 30-lb. roofing felt using 4d galvanized box nails. Overhang the shingles 1 in. beyond the face of the fascia.

## ROOFING

Much of the beauty of the interior comes from the 1x6 cedar boards visible between the rafters. These boards alone, however, aren't enough to give stability to the structure, so they're backed with 5/8-in. CDX plywood. The plywood also adds enough thickness to keep the shingle nails from poking through the underside of the roof.

First, nail the 1x6 roof boards to the rafters (**Photo 9**) with 8d nails. Start at the bottom flush with the ends of the rafters and work your way to the top, leaving a 1/8-in. clearance between the boards. Overlay the plywood onto the 1x6 and nail it through the plywood and roof boards into the rafters with 10d nails.

Once the plywood layer is complete, nail the finished fascia (L1, L2) over the subfascia and align it with the bottom edge of the plywood. Next, roll on the 30-lb. roofing felt and overlap each layer by 3 in. Then nail the No. 2 cedar shingles to the roof deck (**Photo 11**) with 4d galvanized nails (follow the positioning instructions that come with each bundle). The first course of shingles must be double thickness and overhang the fascia (L1, L2) by 1 in.

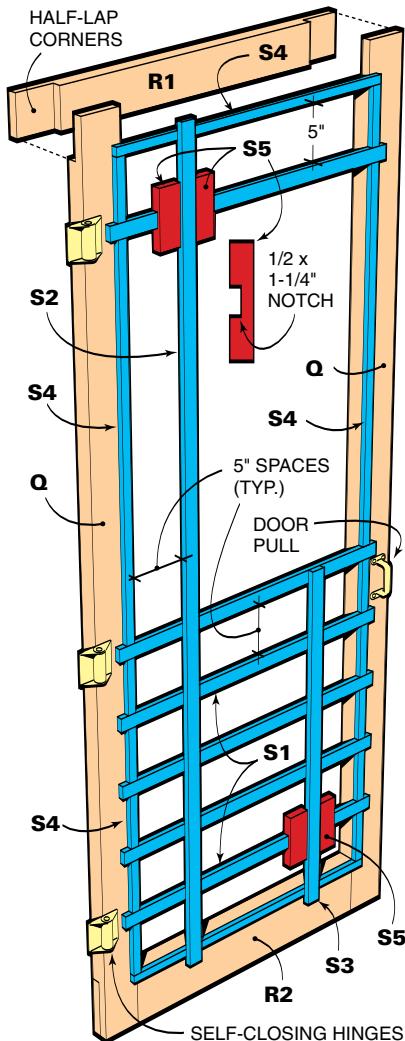
You'll need to trim the cedar shingles to conform to the angle above the hip as you lay them. Once you've finished shingling, cover the gaps over the hip by ripping 4-in. wide pieces of shingle to create a cap over the hips and ridge.

## MAKING DOORS

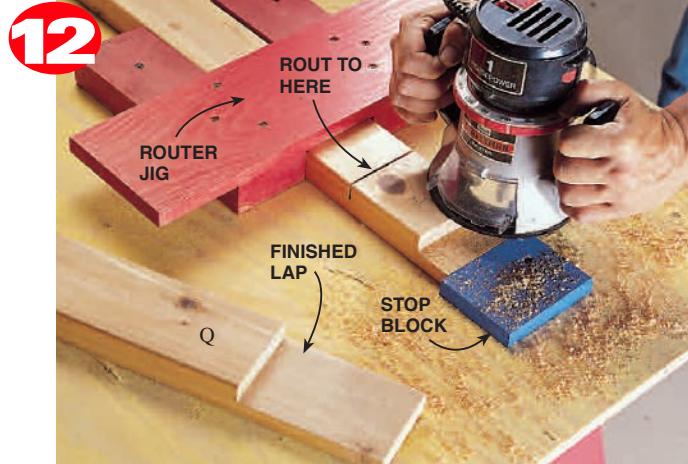
Making the doors is the most time-consuming part of the project, so we broke it down into manageable tasks. Since you can build them in the garage on a work table, it's the perfect job for rainy days.

First cut the door stiles (side pieces) and the rails (upper and lower horizontal pieces) to length. Then set up a simple jig (Photo 12) to use with your router to make the half-lap joints on the ends of all the stile and rails. Use a 3/4-in. straight bit. If you have a radial arm saw, you could make the half laps with a dado blade.

**Fig. G Door Assembly**



**ROUT** the laps for the door frame joints using a homemade router jig screwed to a plywood work surface. The door frames are made from 2x4 and 2x6 cedar. The side stiles and top rail are 2x4. The bottom rail is 2x6.



**ASSEMBLE** each door using a jig to ensure each frame is square. Apply construction adhesive to the lap joints on each corner, then screw the parts of each lap joint together with five 1-1/4 in. decking screws. Keep the screws at least 1 in. from the edges of the frame because you'll need to trim the door to size later.



**FLIP** the door over once you've assembled the frame. Cut your 30-in. wide screen to length (leave an extra 2 in. on each end for stretching) and staple it to the frame every 2 in. with 1/4-in. staples. It's best to start at the top and work your way down each side for a tight-fitting screen.





15

**CUT** your screen molding and muntin trim to size from 2x6 cedar using a table saw. Attach the screen molding to the door frame using 3d galvanized finish nails.

The next step is to set up a 3/4-in. thick, 4 x 8-ft. plywood work surface over a pair of sawhorses. Use scrap wood to make blocks (**Photo 13**) to hold the door parts square.

Before you apply screen to the door frames, flip them over so the screws are on the back and then staple the screen as shown in **Photo 14**. Once the screen is applied to the doors, you can cut the moldings (see **Fig. G**) from 2x6 cedar (use a table saw) and nail them to the door frame with small screen molding nails.

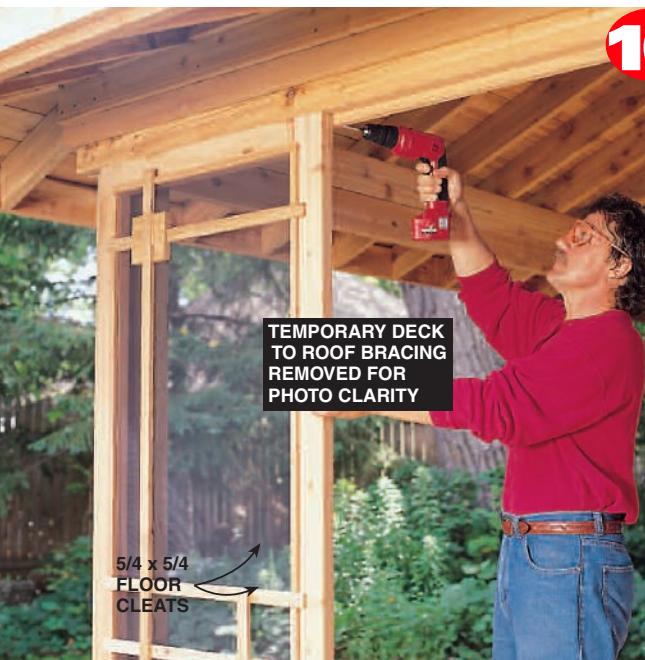
## INSTALLING THE DOORS

Before you install the doors, nail the cleats to the deck (**Photo 16**) and the upper doorstop to the inside edge of the lower header. It's best to use a string line to mark the deck to get the floor cleats positioned in a straight line. To align the doors properly in the opening, find the center of each side and measure each door width (mark it off on the deck) back to the corners.

You may have to trim each door's height slightly to fit the opening. The stationary doors should fit snugly, and the operable doors need 3/16-in. clearance on the bottom and 1/8-in. on the top. Screw the corner doors to the post (the door edge should cover roughly half the post), the upper doorstop and the lower floor cleat. The longer side has an additional door, which should be positioned tight to the corner door and nailed to the floor cleat and the upper doorstop.

The operable doors (the double doors on the front and back, and the single on the long side) must be shimmed on the bottom and top (**Photo 18**). This will hold them in place while you screw the self-closing hinges to the adjacent stationary door frame and the swinging door. Remove the shims and make sure the operable doors swing freely. To finish the door system, you'll need to install the vertical stop (P5, P6, P7) as shown in **Fig. A** to the back of the doors. This trim runs from the floor cleats to the upper doorstop, covers the gaps between the doors and finishes off the interior.

Finish each exposed post with a cedar 2x4 and a 2x6 (T1 and T2; see **Fig. H**) that are ripped to width and then cut to length. Be sure the front of the screen house has the wider piece to overlap the longer side post trim.



16

**INSTALL** the floor cleats (P1 and P2) even with the outer edges of the posts. Then fasten the cleats to the stationary doors to secure them to the decking.



17

**FIT** each stationary door, trimming the top or bottom if necessary. Once each stationary door fits snugly from the floor to the header, screw it to the upper doorstop (P3) and the floor cleats (P1 and P2) with 2-in. galvanized screws.

## THE CORNER BRACKETS

Cut the bracket supports and the curved corner brackets (U1, U2) as shown in Fig. H. Notice that the top of the bracket support is notched to fit over the header trim. Screw the bracket supports (pre-drill all these holes) to the corner trim with 3-1/2 in. galvanized screws (use three screws for each bracket). Next, screw the curved corner bracket to each bracket support (two screws on each side) and to the upper jack rafter (four 3-in. screws here).

Now you're ready to clean up the work site and enjoy the rest of the summer in your beautiful outdoor space.

**ATTACH** the free-swinging doors to the stationary doors with self-closing face-mounted hinges. Use three hinges per door and make sure each door has a bit more than 1/8-in. clearance on all sides.

18

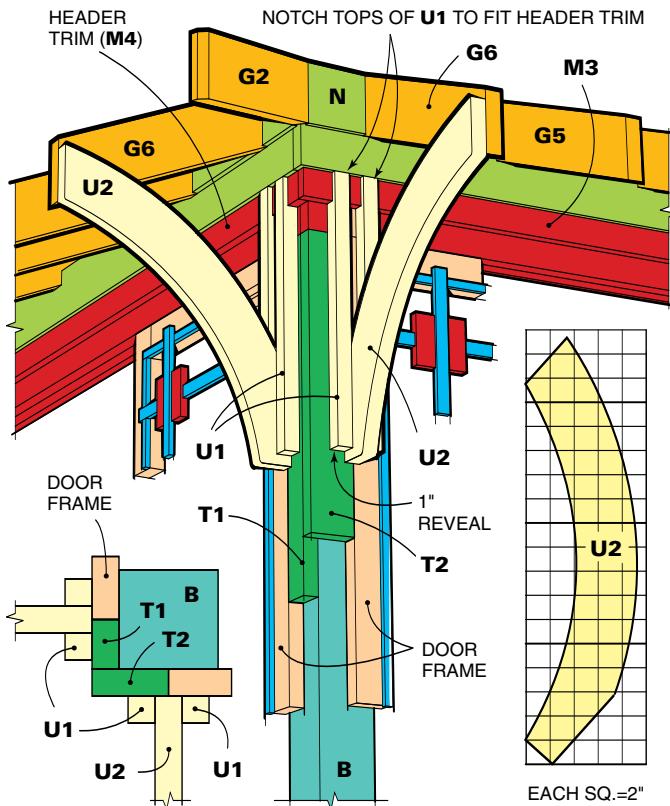


**INSTALL** the eight corner brackets (U2) to the bracket cleats (U1) with 3-in. galvanized screws. The corner brackets are structural as well as decorative. See Fig. H for details.

19



Fig. H Corner Details



## Cutting List

KEY	QTY.	SIZE & DESCRIPTION			
A	3	5-1/2" x 5-1/2" x 182" .60 treated timber (beams)	P4	2	5/4 x 2-3/4" x 122-1/2" cedar (upper doorstop)*
B	4	5-1/2" x 5-1/2" x 103" .60 treated timber (posts)	P5	4	3/4" x 2-3/4" x 78-1/8" cedar (vertical doorstop)*
C1	30	1-1/2" x 5-1/2" x 105-1/2" .40 treated (joists)	P6	8	3/4" x 2-3/4" x 79-1/4" cedar (notched vert. doorstop)*
C2	15	1-1/2" x 5-1/2" x 12" .40 treated (joist blocks)	P7	2	3/4" x 2-3/4" x 79" cedar (swinging vert. doorstop)*
C3	2	1-1/2" x 5-1/2" x 182" .40 treated (rim joists)	Q	36	1-1/2" x 3-1/2" x 80" cedar (door stiles)
D	39	5/4 x 5-1/2" x 16' cedar decking	R1	18	1-1/2" x 3-1/2" x 32" cedar (door top rails)
E1	2	1-1/2" x 5-1/2" x 165-1/2" cedar (inner headers)	R2	18	1-1/2" x 5-1/2" x 32" cedar (door bottom rails)
E2	2	1-1/2" x 5-1/2" x 136-1/2" cedar (inner headers)	S1	108	1/2" x 1-1/4" x 28" cedar (horizontal door bars)
E3	2	1-1/2" x 5-1/2" x 168-1/2" cedar (outer headers)	S2	18	1/2" x 1-1/4" x 74" cedar (vertical door bars)
E4	2	1-1/2" x 5-1/2" x 139-1/2" cedar (outer headers)	S3	18	1/2" x 1-1/4" x 32-3/4" cedar (vertical door bars)
F	1	1-1/2" x 5-1/2" x 32" cedar (ridge board)	S4	18	1/2" x 3/4" x 17' cedar (screen molding)
G1	8	1-1/2" x 5-1/2" x 10' cedar (common rafters)*	S5	72	3/4" x 2" x 5" cedar (decorative door squares)
G2	4	1-1/2" x 5-1/2" x 12' cedar (hip rafters)*	T1	4	1-1/2" x 2-3/4" x 80" cedar (corner trim)*
G3	8	1-1/2" x 5-1/2" x 7' cedar (jack rafters)*	T2	4	1-1/2" x 4-1/4" x 80" cedar (corner trim)*
G4	8	1-1/2" x 5-1/2" x 6' cedar (jack rafters)*	U1	16	1-1/2" x 1-1/2" x 26" cedar (bracket supports)
G5	8	1-1/2" x 5-1/2" x 4' cedar (jack rafters)*	U2	8	1-1/2" x 9-1/4" x 36" cedar (curved brackets)*
G6	8	1-1/2" x 5-1/2" x 3' cedar (jack rafters)*			
H1	2	1-1/2" x 5-1/2" x 214" cedar (subfascia)			
H2	2	1-1/2" x 5-1/2" x 185" cedar (subfascia)			
J	800	linear ft. of 3/4" x 5-1/2" cedar			
K1	11	5/8" x 4' x 8' CDX plywood			
K2	400	sq. ft. of No. 2 cedar shingles			
L1	2	3/4" x 5-1/2" x 217" cedar (fascia cut from two pieces)			
L2	2	3/4" x 5-1/2" x 186-1/2" cedar (fascia cut from two pieces)			
M1	2	1-1/2" x 5-1/2" x 165-1/2" cedar (lower headers)*			
M2	2	1-1/2" x 5-1/2" x 136-1/2" cedar (lower headers)*			
M3	2	5/4 x 2-3/4" x 167-1/2" cedar (header trim)*			
M4	2	5/4 x 2-3/4" x 138-1/2" cedar (header trim)*			
N	4	3/4" x 5-1/2" x 14' cedar (outer rafter blocking)*			
P1	4	5/4 x 5/4 x 61-1/4" cedar (floor cleats)*			
P2	4	5/4 x 5/4 x 29-1/2" cedar (floor cleats)*			
P3	2	5/4 x 2-3/4" x 149" cedar (upper doorstop)*			

\* Cut to fit

## Hardware & Miscellaneous

ITEM	QTY.
Crushed rock	1 cu. yd.
1/2" x 5" galv. lag screws	8
1/2" x 3-1/2" galv. lag screws	24
16d galvanized nails	5 lbs.
10d galvanized casing nails	15 lbs.
8d galvanized nails	5 lbs.
4d galvanized nails	15 lbs.
3d galvanized finish nails (screen molding)	2 lbs.
2" galvanized screws	2 lbs.
3" galvanized screws	2 lbs.
3-1/2" galvanized screws	2 lbs.
30-lb. roofing felt	400 sq. ft.
1/4" staples	3 small boxes
30" black aluminum screen	120 ft.

## For More Information

- "Pro Tips for Successful Measuring and Marking," May '98, p. 79.
- "Using Tools," March '98, p. 25. Getting rid of grass.
- "Using Tools Special Section: Circular Saws," June '94, p. 32.
- "Using Tools," March '95, p. 18. Chalk boxes.
- "Using Tools," July/Aug. '96, p. 13. Router basics. 

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