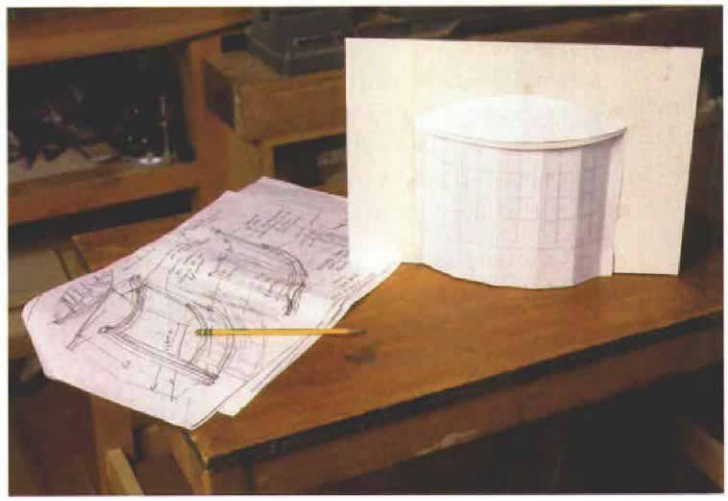
Building a Bow Window From Scratch

Lay out the curved plates with a trammel, then use them as a bending form for laminated trim

BY SPENCER HORN

It would have been a whole lot easier had Lee and John Neff just bought a stock bow window. Easier, maybe, but even the best ready-made window probably would have been a little off in one way or another. Working from an early photograph of their 1915 bungalow-style house in Seattle, the Neffs and architect Ray Studebaker had already restored many details obliterated in a 1950s remodel. So getting a window built to match made perfect sense, even if it was a little more trouble.



A paper model proves a point. The author was convinced the roof would be a section of a sphere—until he made a paper model. He had to agree with his building partner that the roof was actually a conical section, much easier to frame and sheathe.

The Neffs wanted a prominent window that would frame views of Lee's gardens and include a shelf inside for plants. Ray had already made changes in the room where the new window would go, including the addition of a pair of French doors and a trellised portico just outside. Window trim would have to be compatible. Contractor Tom Clark and I provided some design and construction ideas. Before long, the window evolved from a floor-to-ceiling unit to one with a seat-height ledge inside decked with handmade tiles (photos facing page). It would have to fit in a rough opening 6 ft. 10 in. high by 8 ft. 9 in. wide.

Windows these days typically arrive as prehung units that include sash, jambs and exterior trim. But I enjoy making divided-lite window sash, so I built the five double-glazed sash for this project myself. Some manufacturers, however, are willing to sell double-glazed sash. Both Kolbe & Kolbe Millwork Company (800-955-8177) and Marvin (800-328-0268), for example, will sell just sash through a local dealer. You also could contact a local millwork shop that makes sash.

Making a curved frame is first

I broke the job into its three major parts: the window frame, the section of curved wall surrounding it and the roof. I made the components in my shop and then trucked them across town to the Neffs' house. I started by making a full-scale plan drawing of the job on ¼-in. plywood tacked to the shop floor. Having this drawing always on hand (well, at least under foot) was a big help.

Drawing layout lines for the curved pieces required a long trammel. I made one from a length of scrap plywood, drilling a pivot hole in one end and a series of holes in the other end to mark the radii for different components (top photo, p. 78). The lines intersected a layout of the rough opening so that I clearly understood how the window would be installed.

The curved plates and the header were made of bandsawn pieces of 2x10 and ¾-in. medium-density overlay (MDO) plywood, cut to the 3½-in. width of a 2x4 framed wall (drawing p. 78). With the radius of this window (76 in. to the outside of the framing), I found that I could get a curved plate 54 in. long from a 2x10—more than I expected. I tucked the curved offcuts away; they made good cauls for gluing up fascia pieces later.

The header is made from three layers of 2x material and a single layer of ¾-in. MDO plywood to add strength and stability. The sole plate is a single layer of 2x material because the bottom of the bay is integral with the framing. The top wall plate (at windowsill height) is a single thickness of 2x plus a layer of ¾-in. MDO (drawing right, p. 79). After the stock had been marked and bandsawn to shape, I placed the pieces on the layout lines, staggering the joints somewhat randomly, and then glued and screwed them together with Titebond II, a water-resistant yellow glue. Once the glue had cured, it didn't take long to scrape off the excess and fair the curve with a file and a spokeshave.

A curved header makes a good bending form for curved trim

Trim pieces are curved to follow the lines of the window. To make the rough stock for the brick mold, fascia, bed mold and backband, I laminated ¼-in. pieces of vertical-grain

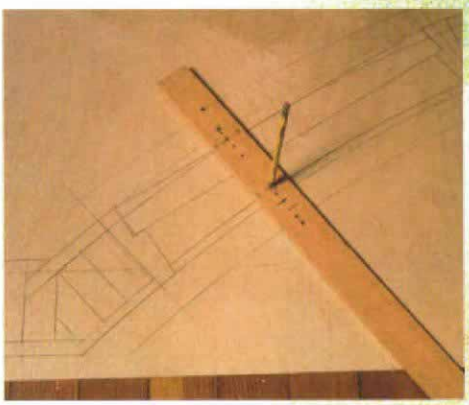
Douglas fir that had been resawn from 1x and 2x material. After planing down individual plies, I glued them together with plastic resin glue, rolling it onto both surfaces with a fine-nap paint roller 4 in. wide. Plastic resin glue has a long open time, so you don't have to hurry as with yellow glue. Depending on which piece of trim I was gluing up, either the inside or outside surface of the curved header made a good bending form. It took just about every clamp I owned.

After the glue had set, I planed the pieces to their final widths and took them to a local mill shop, which profiled them on a shaper. The bed mold was a stock profile, but the brick mold, which we were matching to existing trim on the house, was a little different. Knives had to be modified to achieve the profile. I made the backband with bearing-guided router bits. Studs for the curved

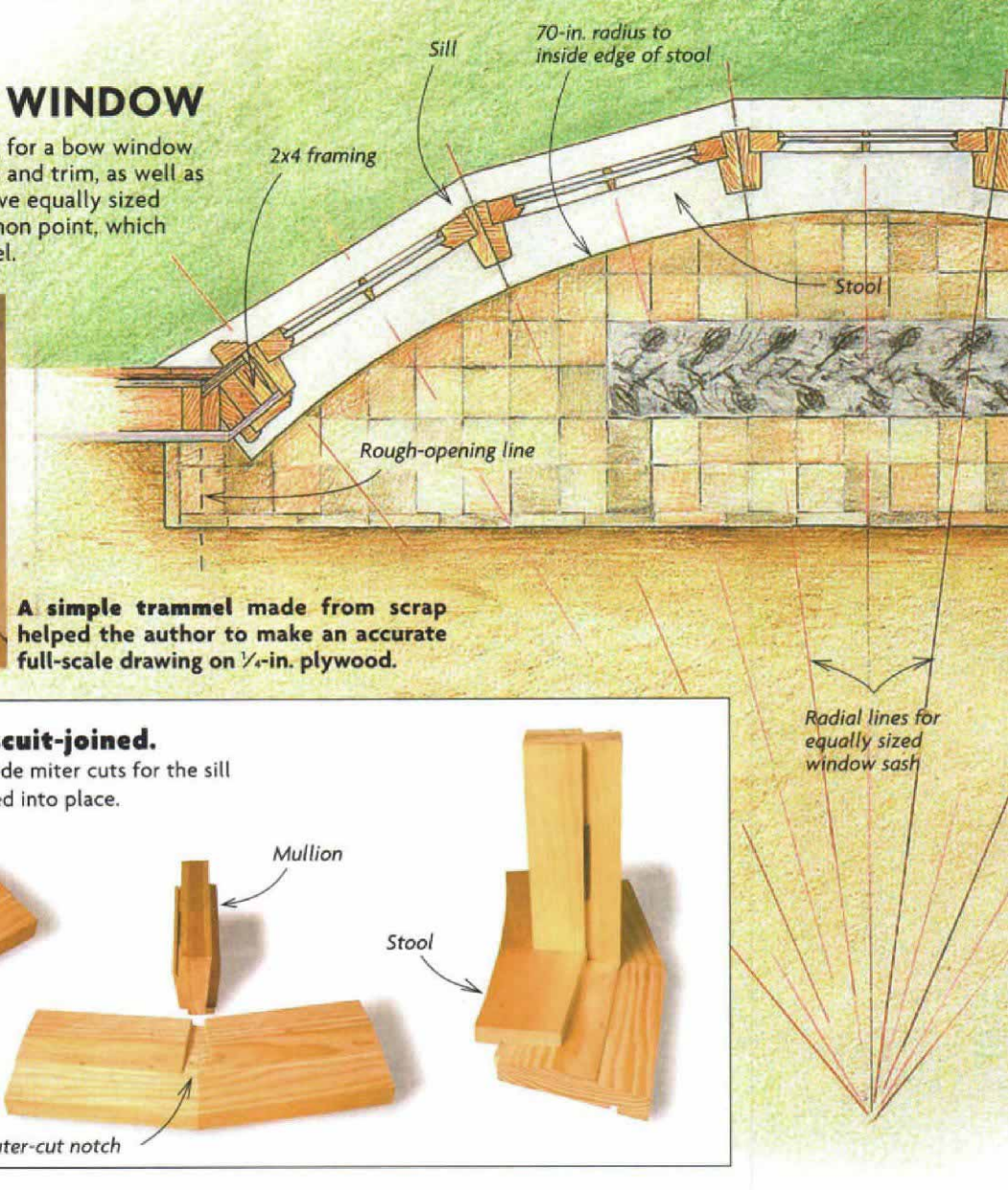
Custom curves. A bow window built by the author looks right at home on this Seattle bungalow-style house (above) while offering great views of carefully tended gardens from the inside (top). Window sash is flat, but trim pieces are laminated curves.

LAYING OUT A BOW WINDOW

The author made a full-scale plan drawing for a bow window with curved lines, representing wall plates and trim, as well as radial lines that divide the opening into five equally sized windows. Layout lines spring from a common point, which locates the pivot for a shop-made trammel.



A simple trammel made from scrap helped the author to make an accurate full-scale drawing on ¼-in. plywood.



Sill pieces are mitered and biscuit-joined.

Radial lines from the full-scale drawing guide miter cuts for the sill stock. Later, laminated mullions are screwed into place.

wall were laid out on 16-in. centers. All the connections through the curved plates were screwed instead of nailed to keep the plate pieces from splitting. Also, the king stud and cripple along with the header and inside-corner framing were made so that they could be taken apart for moving. The wall section below the window was then sheathed, using three layers of ¼-in. ACX plywood glued between layers with Titebond II and stapled. Joints were staggered. The sheathing was clamped (not permanently attached) to the king and cripple studs and was cut 2 in. longer than these members so that it could be buried in the corner framing at the rough opening for additional shear strength.

Segmented top jambs are mitered and then cut to the wall curve

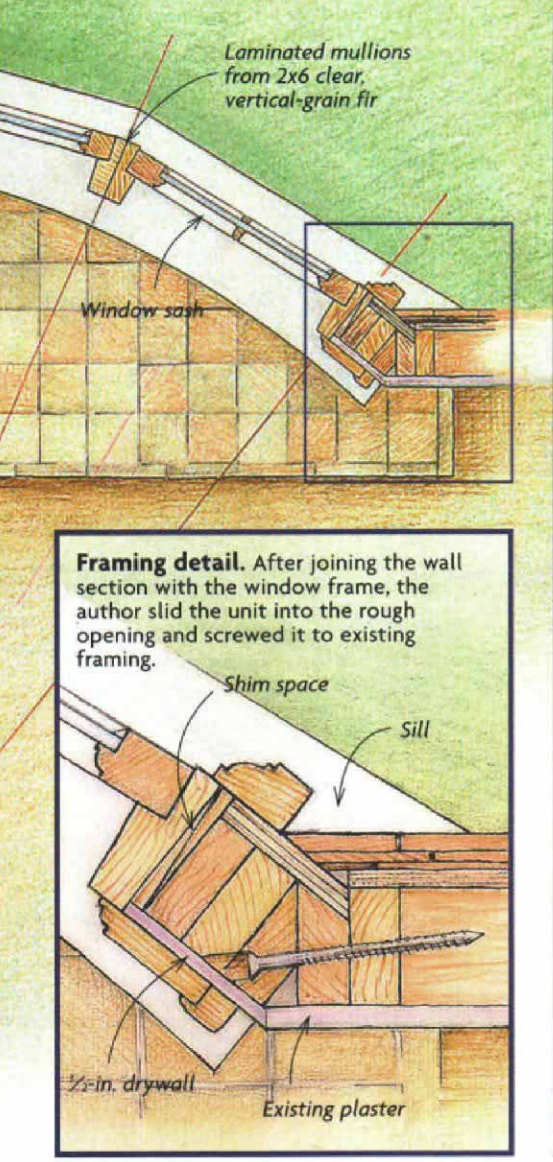
I started the frame for the window by gluing up stock for the mullions, the vertical pieces that divided the frame into five equal openings. Each mullion is made of glued-up pieces of 2x6 vertical-grain fir, which I thought would be more stable than a single piece of 4x6 stock.

Because the window is laid out along radial lines, the mullions are shaped like trapezoids—wider toward the outside, narrower on the inside—and rabbeted to accommodate the sash. I cut the rabbets in the mullions on the table saw and cleaned them up with a shallow pass on a jointer. Weatherstripping for the two operable windows (one on each end of the bow) fits into a groove cut with a thin-kerf blade.

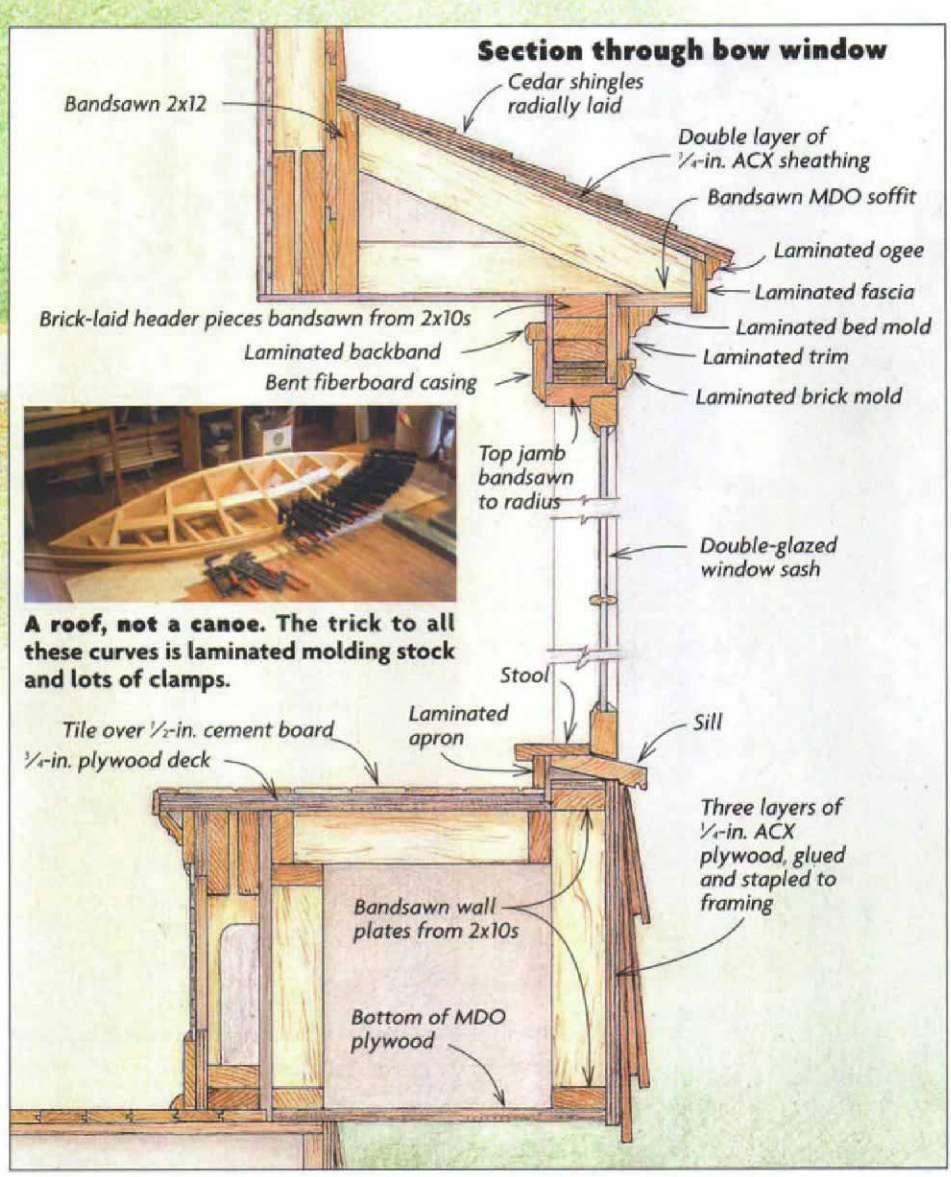
In addition to the mullions, I also needed five segments each of the top jamb, the sill and the stool. Jambs were made of 2x8 vertical-grain fir, the sill was a manufactured mixed-grain fir stock, and the stools were made out of 5/4x8 vertical-grain fir (photos above). Miters for these pieces were marked from the radial lines on my full-scale drawing. I made the cuts on a table saw using a crosscut sled and a wedge that kept the stock at the right angle. Sill and stool pieces for the two outside windows were left a little long so that they could be notched around the wall to form ears for their casings.

On the top jambs, I cut the rabbet for the sash first and then bandsawed the inside curve. The offcut from that operation could be jointed and glued to the outside of the piece to minimize the width of the stock I needed. The sill is faceted on the outside; I cut the inside curve on the stool pieces before the pieces were glued together. These parts are biscuit-joined and clamped together using the wall framing as a holding device. A 2x block screwed to each end of the wall prevented each curved assembly from spreading as it was clamped to the wall. Later, I added 3-in. by 6-in. gussets of ½-in. plywood to reinforce the miter joints, at both the top and bottom of the window frame.

Drawings: Christopher Clapp



Framing detail. After joining the wall section with the window frame, the author slid the unit into the rough opening and screwed it to existing framing.



A roof, not a canoe. The trick to all these curves is laminated molding stock and lots of clamps.

With the sill and head-jamb sections glued up, I cut the mullions to length, rabbeted the ends and then cut a corresponding notch at each joint in the sill and top jamb. For this operation, I made a jig of ¼-in. tempered Masonite and used a guide bushing on a router. At the same time, I routed mortises for the casement hardware, which I bought from Truth Hardware in Owatonna, Minnesota (507-451-5620). Then the frame could be assembled with glue and screws.

There's still the roof to go

Tom and I took out the old window and installed the new bow window in a day. First, we assembled the wall framing around the window. Then the wall section and the window frame were slid into place, shimmed and screwed into the rough opening. While Tom worked on framing for the window ledge and concealed radiator, I went back to the shop to fabricate the roof.

A simple paper model of the project (photo p. 76) proved the roof was a shallow conical section, as Tom had suggested, not part of a sphere as I had supposed. Plywood bent over the roof's surface did not have to make a compound bend. In determining the curve of the ledger board where the roof met the wall of the house, we decided to leave a small amount of wall between the roof's high point and the existing soffit on the house.

The 2x4 rafters were laid out on radial lines (the only lines across the surface of a cone that are straight). The tops of the rafters were attached to a bandsawn piece of 2x12 that could be attached to the wall of the house. At the other end, rafters were attached to a piece of bandsawn ¾-in. MDO plywood soffit that had been laid out with the trammel. Plies to laminate the fascia were resawn from 1x5 vertical-grain fir planed to ¼ in. The fascia was glued in place by screwing through all three layers into the rafter ends and then clamping between the rafters with cauls (photo above). Once the glue was dry, the fascia was unscrewed, dimensioned and reattached. The 2x4 ceiling joists were then added.

Roof framing was installed and then sheathed in place with a double layer of ¼-in. ACX plywood that had been precut to follow the house intersection line but left a little long at the fascia line. Using a router with a flush-trimming bit, the excess sheathing was trimmed off in place. Brick mold and trim moldings were marked in place, cut and installed. The roof as well as the wall surface below the window is cedar-shingled. Tiles for the deck on the inside were handmade by Chuck Totten. □

Spencer Horn is a woodworker and furniture designer, and one of the founders of Northwest Fine Woodworking, a gallery in Seattle, Washington.
Photos by Scott Gibson, except where noted.

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