REMODELER'S GUIDE TO BUILDING SKYLIGHT WELLS

BILL BALDWIN

by Jim Hart

Few jobs test the skill of a remodeler more than installing a skylight. Even a simple skylight job involves framing, roofing, insulating, and interior finishing, and more complex installations may include plumbing, electrical, and mechanical work. You also need to make sure that you and your customer both envision the same finished product. Mere technical expertise won't save your skin if the skylight your customer imagines doesn't match the skylight you install.

The challenge is to do a quality job that satisfies the client, while handling enough of the work yourself to make money. The cost of skylight installation is high, but there isn't much room for error. A small, high-quality venting unit can cost over $500, and when you add other materials and two or three days' labor, a complete job quickly approaches $2,000.

Evaluate existing conditions carefully to avoid surprises when you open the roof

Choosing a Skylight

When I plan a job and prepare an estimate, I pay close attention to existing conditions that, if ignored, could result in cost overruns, failed inspections, and client disappointment.

Location. Even if the clients have plans drawn by an architect, I like to hear firsthand where they want to put the skylight and what they hope it will do. This gives me a chance to make sure they're being realistic about how the finished skylight will perform. While many people know, for example, that a large, south-facing skylight will brighten their room, they may not have been warned about overheating in summer. (For more on how skylights affect interior heat and light levels, see "Designing With the Sun in Mind," *Building With Style*, 2/94).

I also like to inspect the proposed location and mock up the ceiling opening with painter's tape, which can be moved from spot to spot without hurting the finish. Visualizing the opening this way helps to keep our discussion closer to reality.

Type and size. Skylights are available in a wide variety of materials, sizes, and shapes. Most clients have a sketchy idea of the kind of skylight they want, so I always take the time to review glazing options, color, and insulating value, as well as whether they prefer a fixed or venting sash, and a domed or flat profile. Size is often determined by the budget as much as by aesthetics, ventilation, and light. A small skylight is not only much cheaper than a large one, it's usually easier to install as well.

Another factor affecting price is whether the skylight will require a site-built curb or has a built-in curb. High-end glass skylights usually have factory-built curbs, and come with preformed flashing packages that make them very weathertight. They often have channels in the frame to accept drywall for a clean installation.

The most economical installation, however, is a domed plexiglass skylight with a site-built curb. Even with the extra labor and materials, building the curb adds only about $20 to the cost of the unit.

Looking for Trouble

The most common skylight installation I do uses a site-built curb on a sloped roof over a flat ceiling. To improve the

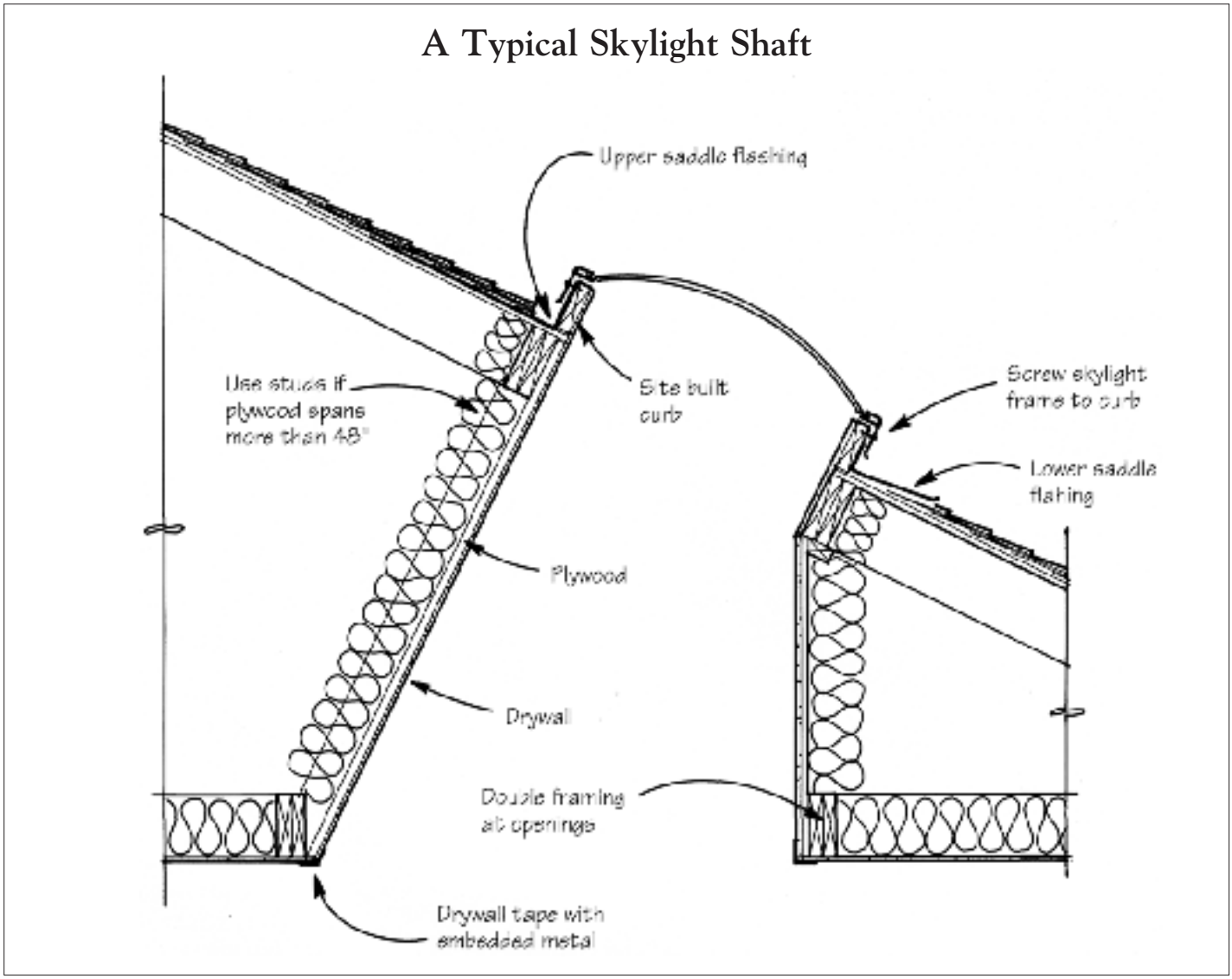

Figure 1. *A typical skylight installation requires a flared shaft between the ceiling and roof openings, and a site-built curb to accept the skylight. The author sheathes the shaft with plywood to reduce drywall cracking from wind loads and seismic activity.*

amount of light the skylight will admit into the room, I usually build a shaft that flares on the uphill side (see Figure 1).

Be careful if you're asked to flare all four sides of the shaft. When the roof is sloped and the ceiling is flat, you may end up with twisted planes or an oddly shaped ceiling opening. When clients insist, I solve this problem by first building a square shaft (no flare) to an intermediate opening that is parallel to the flat ceiling (Figure 2, next page). The shaft can then flare on all four sides the rest of the way to the ceiling. This works, but it adds a day's labor to the job.

While scoping out the job, I am always on the lookout for problems with the ceiling and roof framing, and for obstructions near the proposed opening that will make installation difficult or impossible.

Roof type and condition. A well-worn asphalt shingle roof can be brittle, and will crumble as you patch in new shingles around the skylight; weathered wood shingles will split.

Always check the thickness of the roofing material. Many skylight manufacturers supply flashing kits sized by roof type (Figure 3, page 47). If there are several accumulated layers of roofing, you'll have to build up the patched area to double or triple thickness to match the existing roof.

Also note the roof slope. Roofs with slopes of less than 4/12 will probably require special flashing. Some manufacturers supply these; for others, you'll have to fabricate a custom flashing.

Skylight shaft design. The greater the distance between the flat ceiling and the skylight, the more difficult the opening will be to frame and finish. Shafts create other problems, too. I once had a client insist on building a skylight in the kitchen, where the roof was 8 feet above the ceiling. The overly tall shaft was awkward-looking and a haven for spiders. Similarly, a constricted shaft can compromise a skylight's effectiveness as a light source. Tall, narrow shafts are also nearly impossible to finish because you can't reach the corners easily and don't have enough room to work.

Tricky framing. A crawl into the attic will reveal major beams, hips, and valleys that may force you to move the skylight to another location. Occasionally, all the desired locations will involve such complex reframing that your clients will decide that the cost is too high.

Avoiding wires and ducts. Although moving a few wires or even a heating

duct to make way for a skylight takes time and should be factored into your estimate, the cost is not prohibitive. On one job, I found a heat register where the clients wanted the opening; fortunately, I was able to relocate the register inside the skylight shaft. Sometimes I've had to remove wires stapled to a strongback running along the top of the ceiling joists. If the wires can't be moved easily or if there is a junction box in the proposed opening, I usually suggest another location.

Interference from existing roof vents. California codes specify that the nearest edge of an operating or venting skylight must be at least 3 feet below or 10 feet away from plumbing vents, 2 feet below or 4 feet away from the nearest gas flue, and 1 foot below or 2 feet away from an "environmental air" vent, such as a dryer or hood exhaust. Since relocating the steel, ABS, or double-wall ducts associated with these vents can be costly, I make sure the skylight will meet the minimum clearances.

Framing the Ceiling

A few carpenters I know start framing skylights at the roof and work down, but I begin at the ceiling and work up. The opening at the ceiling is the most visible aspect of a skylight and must be located accurately. Also, by marking the ceiling, I give the client a better sense of how the opening will look before I cut any framing members.

To start, I ignore the flared sides of the shaft and mark the ceiling opening as if it matched the rough opening measurements of the skylight. I make sure the opening is parallel to the closest wall, and poke nails through the ceiling at the corners of the tape outline.

Up in the attic, I find the four corner nails, and check to see how the existing framing corresponds to the proposed opening. Sometimes, sliding the opening a few inches one way or the other will keep the cutting of ceiling joists and rafters to a minimum.

I never assume that the joists are parallel or square with the walls below. I avoid using an existing ceiling joist as one side of the skylight opening if it's more than 1/2 inch out of square over 4 feet.

I usually use 1/2-inch or 3/4-inch plywood on at least two sides of a skylight shaft. Wind loads, seismic activity, and the drying of framing lumber can create a lot of movement between the roof and the ceiling. The plywood creates a stable connection that minimizes drywall cracking. Plywood also takes the place of nailed "mini studs," and provides solid backing for drywall. And once the plywood is cut to fit the shaft wall, it can be used as a template to cut the finish drywall.

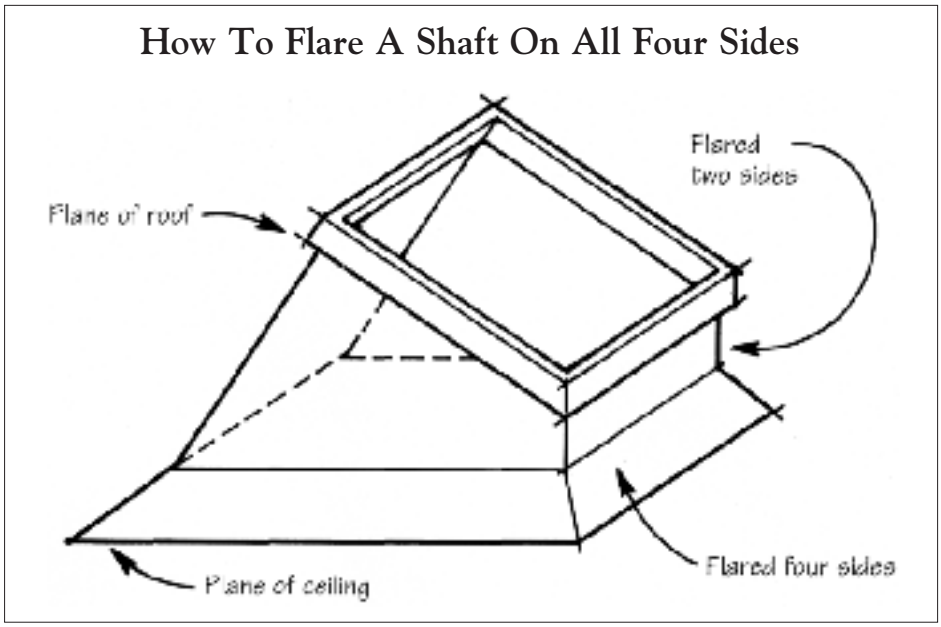

Figure 2. *Flaring a skylight shaft on all four sides will create a trapezoidal ceiling opening. To solve this problem, first build a rectangular opening below the skylight and parallel to the ceiling. Then you can build a straight-sided shaft up to the skylight, and flare the shaft down to the ceiling on all four sides.*

Marking the width. I mark out the width of the opening on the ceiling, allowing for the thickness of the plywood. I usually double the joists on all four sides of the opening to eliminate sag in the ceiling, and to provide solid nailing around the opening for trim and valances. This means adding 3 1/8 inches to the rough opening dimensions. The extra 1/8 inch allows for the fact that dimensional lumber is usually a little thicker than 1 1/2 inches.

Rarely does the skylight fit perfectly between existing joists. If I must cut through more than two joists, I run 2x4 strongbacks just behind the opening, nailing 16d nails into all the joists. This transfers my weight onto unaffected joists as I work, and minimizes movement in the ceiling during cutting and nailing.

Marking the length. Next, I adjust the length of the opening to allow for the two angled sides of the shaft. Typically, the lower wall of the shaft is plumb, so I establish this point first while I'm in the attic. I build the upper wall of the shaft at right angles to the slope of the roof. I use a framing square to project the plane of this wall from the rafters to the ceiling. When I have marked everything out, I double-check to see that the ceiling opening and roof opening will both end up where I want them. Sometimes I need to make a second trip back into the attic to adjust the dimensions one way or the other.

Cutting the joists without hurting the ceiling is tricky. I prefer a reciprocating saw to a circular saw for this job. If the joist slumps and the cut closes, I'd rather deal with kickback from a reciprocating saw than from a circular saw. I hold the saw vertically (plumb and square to the top of the joist) and cut through the full width of the joists in one pass. With 2x6 joists, a medium-length reciprocating saw blade works just about perfectly. To be sure, check the throw of the blade at very slow speed; you may have to angle the saw slightly to avoid punching through the drywall. No blade is quite right for 2x4s, so you'll have to angle the saw more sharply to allow clearance.

Inspectors like to see hangers used on the joists that frame the opening, but I prefer framing clips, such as Simpson A35s and L22s. Because the clips don't wrap around the bottom of joists, they're easier to install when you're trying to preserve the existing ceiling, and they

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Figure 3. *Skylights can be ordered with flashing kits designed for either low-profile or high-profile roofing materials.*

don't make bumps in the drywall below. Where engineered plans require hangers, I use either lightweight hangers, such as Simpson LU26s for a 2x6 ceiling, or I kerf the joists under the hangers so they make less of a bump.

With the opening framed, the ceiling can be cut away from below to avoid damage to the drywall.

Framing the Roof and Shaft

The hole in the ceiling provides easy access to the roof for further framing. Project the rough opening onto the underside of the roof sheathing, repeating the steps used to determine the flared sides of the shaft.

At this point, check to see if the roof is level across the rafters. If it's not, the shaft will look out-of-whack. I lay a level along the ridge or plate to make sure it's level, then bring the level to the proposed opening and lay it across the rafters. Make sure both ends of the level are equidistant from the ridge or plate, whichever you're using. If the roof is out of level more than 1/2 inch in 4 feet, make a purlin brace or jack up an existing one to correct the problem.

Mark the roof opening as you did the ceiling opening, allowing for plywood and double headers around the opening. If you're cutting more than two rafters, tack a piece of 2x above and below the opening so it catches a rafter on either side that won't be cut. This will hold everything in place temporarily after you've made your cuts. For smaller openings, the roof sheathing is usually strong enough to temporarily support the span. Use the reciprocating saw again to crosscut the rafters. You don't need to be as careful as you were with the finished ceiling because the roofing around the opening will be replaced.

The shaft. With both openings framed, you can now frame the shaft. If the shaft will be more than 4 feet tall, I use 2x4 studs 16 inches on-center to back the plywood; otherwise, the plywood can be unsupported.

After cutting the plywood for one side, trace the shape onto a second piece for the opposite side. Similarly, you can use the plywood pieces as templates for the drywall. When cutting the drywall, remember to add the height of the curb to the top of the pieces.

Installing the Skylight

Before cutting through the roof sheathing from inside the shaft, I remove the roofing from an area that's at least a foot wider in each dimension than the skylight. This saves wear and tear on blades and makes the cutout lighter and easier to handle.

Building the curb. I assemble the curb on the ground, using redwood or pressure-treated lumber for weather resistance. When placing the curb on the roof, make sure the sides line up with the opening, and toe-nail into the doubled perimeter framing.

Accurately calculating curb height is crucial. The flashing provided in the skylight kit should come within 1/4 inch of the top of the curb or rise slightly above the curb. If it doesn't come up high enough, it may leak, and correcting the problem — by counterflashing or by cutting down the curb — is aggravating and time consuming. Remember to allow for the thickness of the roofing material, since the flashing at the sides and bottom sit on top of the roofing.

Roofing and flashing. Before installing the flashing, I roll roofing felt up the side of the curb to ensure the skylight is leakproof. I always paint the flashing a color that blends with the roof color (prepainted aluminum flashing can be ordered with some skylights). It's important to etch galvanized flashing with a mild acid, such as vinegar, before painting; otherwise, the paint will peel.

The bottom saddle flashing goes on first, but only after restoring the shingles up to the bottom edge of the skylight. You may want to use adhesive for both the shingles and the flashing if you're in a high-wind area. Next, install the step flashing along the sides, weaving it into each successive row of new shingles. Nail only to the curb to allow for expansion and contraction.

At the top of the skylight, I make sure the upper saddle flashing slides at least 3 inches under the felt. To nail in the last row of new wood shingles, I gently pull up the old shingle long enough to get a nail into the new one just under the old one, then push the old shingle back down. Now the skylight can be set in place and screwed down. I've seen many skylights that are framed well, but are positioned carelessly, leaving unequal reveals of frame around the perimeter. To do this right is a two-person job: One person on the roof to screw the skylight down (a cordless drill is perfect for this), and one person inside under the skylight to help center it.

Drywall, mud, and tape. Drywall should be cut precisely and fit tightly at the corners. For a neat termination at the top of the curb, use galvanized J-bead. Don't use the factory edge here, since filling the bevel requires more mud and longer drying time. The factory edge works well, however, at inside corners in the shaft because it makes positioning the tape much easier. For outside corners, I like to use paper tape embedded with metal instead of standard corner bead. Corner bead is more difficult to set and doesn't work very well on angles other than 90 degrees. I rarely use wood to trim the drywall at the curb because the finish usually blisters from the heat. ■

Jim Hart works for The Farrell Company in Los Altos, Calif., and is a contributing editor to the Journal of Light Construction.