

Detailing Deck Railings

by Gordon Tully

A raised deck can make a house much more livable, especially if there is a view. But in most cases the deck is an afterthought. A typical raised ranch with an awful porch added on to the back wall is the worst variety of the species: Altiplanus Appendix Horribilis.

Designing For Deck and Railing

Though this column will focus primarily on railings, I'll first give a strategy for deck design.

Solve the functional problems of the deck first. For instance, a deck can be flush with the house floor, or placed down a step or two so as not to obstruct the view, so consider location and orientation. Decide how big it will be, and if you want a stair.

Next, choose a "design pattern" that complements the overall building design. Avoid the "deck-as-outgrowth syndrome," which produces a platform

and an open railing, supported by a few spindly posts spaced as far apart as possible).

Decide whether to raise the deck off the ground, or cantilever it in some way. Cantilevered decks don't usually look right hanging from solid, all-of-a-

It is not easy to support a free-standing railing. The only reason there are not more failures is that people tend to back away from a railing that feels rickety.

piece houses. They can be very dramatic, but save them for houses that are structurally showy. Sketch out the shadows the deck will produce and assess the deck's impact on the light and view. Even decks on the north side will cast consider shadows.

Choosing the Railing Design

Choose a railing design that completes the pattern and is in scale with the design of the deck and the house. Don't glue yesterday's railing design on today's deck.

Railings must support people who push against them. Remember, you must meet codes for loading. Massachusetts' code requires that railings resist a horizontal concentrated load of 300 pounds applied

anywhere at the top of the railing, or—a more severe test—a continuous 50 pound per linear foot horizontal load applied to the top of the railing. To get a feel for the problem, consider a segment of a continuous railing, running between two posts. A horizontal douglas-fir 2x4 properly supported at the ends and braced with vertical balusters could meet code on a span of 8 feet; a 2x6 might reach 12 feet. With a continuous railing spanning 8 feet, the rail and the post pose no problem; but the joint where the post attaches to the deck framing is grossly overloaded. The 3/4-inch bolts would fail at a 1,000-pound load. If you carry the post 8 feet down to the ground, the load on each bolt is reduced by a factor of ten (see Figure 1), and the problem evaporates.

If you support widely spaced newel posts off the deck structure, you may have to use specially fabricated steel connectors because of the expected load. (I have looked in vain in the Simpson catalog for a fabricated gizmo that would solve the problem.) You may even have to make the main deck framing and post supports out of steel.

Finally, choose a deck structure that supports the railing. The deck structure is the more flexible system, so work it out after the railing is designed. Surprisingly, this makes a lot of sense. It is not easy to support a free-standing railing, and it can be frustrating to fight with the structural railing-to-deck connection if the railing and deck have been designed independently. The only reason there are not more failures is that people tend to back away from a railing that feels rickety.

Supporting A Railing

Here are a few ways to support railings:

- Make each baluster structural, supporting its portion of the railing. By breaking the load up into very small pieces, the problem is easily solved with ordinary fasteners.
- Put in strong newel posts that

support the railing as a horizontal beam. The balusters will not be for structural support; they will merely fill in the holes.

- Let's say your porch is small in area, ten feet square, for example. Let's also say this porch is attached to the house. You will have two posts, one at each corner away from the house, and you will have three railings: two coming out from the house, and one parallel to the house. Anchor the two railings coming out from the house to the face of the house. Now, if you cross brace from post to post, the three railing sections will buttress each other (see Figure 2).

Build To Last

Prevent decay. Builders in the 1890s had access to first-growth woods with vertical grain, and they used very effective lead paints. Modern paints and stains last maybe five years. Soon oil-based coatings won't even be available. So, the structure must now be designed to give protection, and this may mean not detailing joints that

Pressure-treated wood offers many advantages, but mot of this wood is Southern yellow pine, which is awful for railings: It splits, warps, twists and checks.

rely on paint to protect and seal. Also, much of our wood now is full of knots, checks, and splits. Because of this, I tend to avoid traditional details.

Pressure-treated wood offers many advantages, but mot of this wood is Southern yellow pine, which is awful for railings: It splits, warps, twists and checks. Use it for the decking, and use it for the basic framing. But make the railing out of something nice, like douglas fir.

Make sure all the wood members are designed to shed water: Bevel rail caps and the tops of horizontal members so water doesn't collect (Figure 3).

Fasteners and Pressure-Treated Wood

Using fasteners on pressure-treated wood can lead to failure because of rusting connectors. Nails and screws corrode as well, so use non-ferrous connectors, preferably stainless steel (hot-dip galvanized steel, at least). Remember that you knock off the galvanizing when you drive the nails, so the heads should be caulked. If you are building near the ocean, corrosion is a very serious problem, so get an experienced structural engineer to design the work.

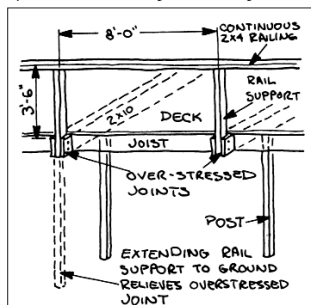


Figure 1. An 8-foot section of railing can grossly overload the joint between the post and the deck framing. Carrying the post 8 feet down to the ground reduces the load by a factor of ten.

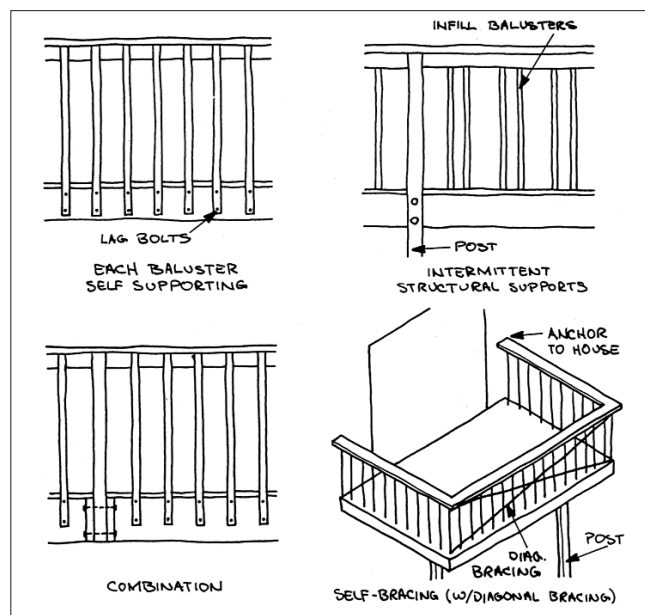


Figure 2. Four types of railing support: Make each baluster structural (top left); put in strong newel posts that support the railing as a beam (top right); combine newel posts and structural balusters (bottom left); anchor railings to the house, and cross-brace the posts (bottom right).

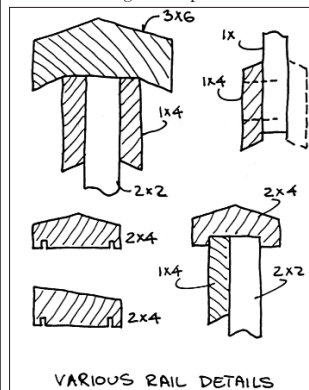


Figure 3. Slope the surfaces of railings and other trim pieces to shed water.

A good way to shield the connector from water where the wood members join is to run the fastener through a short piece of copper tubing (see Figure 4). The connector is still exposed at the head, so cover it with glued plugs.

Protect Railings

When the newel post extends above the railing, the rail must be attached on the side of the post by toenails, a bracket, or some wood members under the rail. Supporting the railing from below makes good sense because water will enter the end

The railing by itself may be strong. But it will count for nothing if it does not harmonize with the rest of the design.

grain of an open joint and loosen toenails.

If the rail runs over the post, attach the rail the same way you would if it came into the side of the post, with a bracket. Use sheet lead over the open miters and rail joints, as you would in a wooden gutter, but don't rely on caulk.

Never nail or fasten a railing in such a way that its failure is sudden and unexpected, as when you screw or nail straight in from the outside. Arrange it so the rail pushes something sideways (like a toenail). The joint will loosen before failing, alerting someone to repair it.

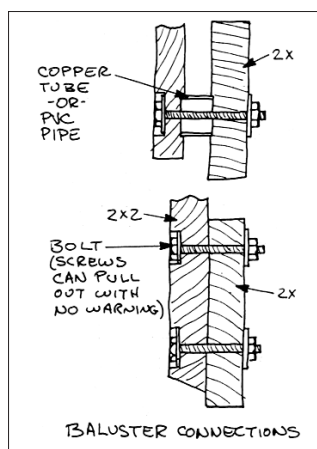


Figure 4. You can shield bolts from water, by running them through a short piece of copper tubing where wood members join (top). Using bolts rather than nails at baluster connectors prevents sudden or unexpected failure (bottom).

Fine-Tuning the Design

Balusters are often sized for load, and they look bulky. Chamfering balusters and newel posts reduces this bulk without compromising strength. Turning can produce handsome balusters, but often this greatly reduces the member's cross-section. When using only square members, it is helpful to alternate wide and narrow spaces and perhaps also to vary the size of the members.

The bottom line is the overall effect on the house. While the railing by itself may be strong, or even handsome, it will count for nothing if it does not harmonize with the rest of the design. ■

Gordon Tully is president of Tully & Ingersoll Architects in Cambridge, Mass.