Installing Cable Railings

A simple approach to a great upgrade

by Mark Ellis

Figure 1. Cable railings exert considerable tension on the end posts. The solution is to use beefier end posts and fill in between them with sub-rails.

Since expansive views are common where I build decks, I'm frequently asked about railings that won't obstruct those views. Two materials that work well are cable and glass, but because of the maintenance required to keep exterior glass clean, most of my clients choose cable.

Before I discuss the installation of cable railings, I'll offer a couple of words of caution. Check with the local building authority before suggesting them to your clients, as some jurisdictions don't allow horizontal railings. The concern is the potential for people, particularly children, to climb over them. Although some in the industry disagree, I think this concern is valid and I make my clients aware of it (especially if small children may use the deck); on occasion a client has opted not to use cable railings because of this issue.

Most of the decks I build are constructed primarily of wood, including the decking and the railing frames. While there are other options, including aluminum and steel frames, this article focuses on building a solid wood frame to support the cable.

Keep Cable From Sagging

I've adapted my standard railing design for use with cable, which interacts with the wood frame differently than other railing materials do. For one, because making the cables taut places a great deal of tension on the end posts, I use larger posts and insert sub-rails between them under the cap rail (**Figure 1, page 1**).

Another concern with cables is that they can wear away the wood on the inside of the holes they run through, especially at angle changes and corners. To protect the wood, cable-railing manufacturers supply fairly inconspicuous sleeves to line the holes (**Figure 2**). Without them, the holes would soon get larger, allowing the cables to loosen and sag.

Finally, cables are very flexible, so they need to be supported more frequently than wood members to prevent sagging. I accomplish this by adding a vertical component whose only function is to maintain the cables' horizontal spacing (**Figure 3**).

Ordering Cable Railing

I use Feeney's almost foolproof system to simplify installation. The manufacturer does the hard work of attaching the threaded adjuster to one end of the cable (**Figure 4**). The other end will be held in place by a quick-connect fitting that allows the cable to feed through in one direction, but grips the cable tightly when tension is applied in the other direction. Feeney also sells tools for working with cable, such as drill bits and cutters. Stainless steel cable is too tough for normal wire cutters, even the large ones electricians use to cut service entrance cable.

The one disadvantage to this system is that you have to be precise when ordering lengths of cable, so you need to figure out the layout in advance. Feeney's cables come in 5-foot increments, up to a maximum length of 70 feet for the 1/8-inch cable I use. A large deck may have more than 70 feet of railing; in that case, you'll also need to know the starting and ending points of each cable run when ordering. Be aware that some suppliers limit their cable runs to even less than 70 feet. The reasoning behind such limits is that the longer the cable, the harder it is to make it as taut as required, and the more tension it exerts on the end posts and their fittings; plus, different end connectors have different limits as to how much they can be tightened.

Once you've determined the lengths of the cable runs, you need to figure out the number of cables required for the height of your railing. The International Residential Code (IRC) says that a 4-inch sphere cannot pass between the

Figure 2. Where cables turn a corner or change angle for a stair, liners are used to prevent the cable from wearing down the wood posts.

Figure 3. Even though cables are tensioned, they can sag mid-span. A lighter-duty member is used between the posts to maintain cable spacing.

Figure 4. The system used by the author comes with the threaded adjuster already attached to one end of the cable.

Figure 5. One upgrade the author chooses is stainless steel caps, rather than plastic ones, to conceal the cable ends.

Cable Suppliers

Some of the players in the cable-rail market are listed below. Products and installation instructions may vary from one manufacturer to another, so make sure you know what's required of each system, preferably before you order it — and definitely before you begin the install.

The most common material is stainless steel. Galvanized cable is a lot cheaper; however, cable railings should last the life of a top-notch deck, and unfortunately, galvanized cables will eventually rust. Make the best choice and go with stainless steel.

AGS Stainless
888/842-9492, agsstainless.com

American Metal Specialties
888/372-9344, cablerailings.com

Atlantis Rail Systems
800/541-6829, atlantisrail.com

The Cable Connection
800/851-2961, thecableconnection.com

Feeney Architectural Products
800/888-2418, cablerail.com

Jakob
866/215-1421, jakob-usa.com

R & B Wagner
888/243-6914, rbwagner.com

Stainless Cable & Railing
888/686-7245, stainlesscablerailing.com

Stainless Cable Solutions
503/830-2123, stainlesscablesolutions.com

cables; most manufacturers recommend placing the cables every 3 inches — rather than every 4 inches — to ensure that a railing meets that requirement, because no matter how tight the cable is, there will always be some play in the center of the run, and over time the cables will stretch, allowing even more sag.

On the deck shown here, the cable run was 53 feet, and I ordered nine 55-foot 1/8-inch cable assemblies. Each assembly comes complete with all the necessary hardware. The only additional items that I order are stainless steel end caps — instead of the colored plastic caps that are included in the basic assembly (**Figure 5**).

Putting the Wood Frame Together

I begin the installation with the backbone of any railing system — the posts. I place them outside the deck framework, for a few reasons; one is so that I can space the posts evenly regardless of the joist layout. Also, posts mounted this way visually break up the continuous band of 2x12 I use for a fascia and rim joist. Another benefit is that I don't need to notch the decking around the posts.

With most cable systems, a 4x6 post is required at the end of each run, and intermediate posts can be 4x4s. Maximum spacing of the posts is generally 6 feet. In addition, intermediate supports are needed to prevent the cable from sagging. These can be additional posts, 2x4s, 2x2s, or even 1x2s. In this case, I used 2x2s. I have used 2x4s in the past.

I cut all the posts to length and bevel their bottoms at 45 degrees to soften the look. Then I line them up, mark the bolt holes, and snap a chalk line 36 inches from their tops to represent where the posts set in relation to the top of the framing. Before putting the posts in place, I drill them for mounting bolts, leaving a couple of posts undrilled in case I have to change the bolt pattern to avoid a framing member. Next, I partially drive a couple of screws on the chalk line to aid in placing the posts at the correct height.

I tack up the end posts first, usually around 2 inches from the corners. While one worker plumbs the post, another adds a couple of screws from the inside of the fascia to temporarily hold the post in place. Once the outside posts are tacked up, I measure the center-to-center length and determine the spacing for the rest of the posts, remembering to keep it 6 feet or less. I mark the spacing and plumb guidelines on the fascia and put up the remaining posts, making sure the bolt-hole alignment works with the framing.

In the old days, I just bolted the posts to the fascia. I have not heard of any of the railings I installed in that manner failing, but since building departments are placing a greater emphasis on post attachment these days, I have altered my method.

Figure 6. Posts are anchored to the framing with 1/2-inch galvanized threaded rod.

Figure 7. Sub-rails are attached to the posts with pocket screws.

My current approach is to tie the posts and fascias to the joists and beams using hot-dipped-galvanized threaded rods (**Figure 6**). This solution has not been engineered, but the building departments I've worked with haven't had a problem with it. Where the fascia is parallel to the joists, I add the rod through one or two joists with nuts and washers on all sides. Where the fascia is perpendicular to the joists, I add the rod through the beam, or through solid blocking if the joist size prohibits me from going through the beam. By adjusting the nuts, I get a very solid post, perfectly plumb.

Once the posts are bolted on, I finish laying the decking to provide a nice surface to work on. After that, I mark two wood rails to the same length, measured between the posts at decking level. One is the bottom rail, and the other is the sub-rail, which is primarily a long block between the tops of the posts; it gets installed first and helps insure the posts will be plumb. I use a Kreg Jig (Kreg Tool; 800/447-8638, kregtool.com) to make pocket holes in it (**Figure 7**), for a strong connection to the posts.

Next, I cut the bottom rail 1/2 inch shorter to accommodate Deckorators (Universal Forest Products; 800/332-5724, ufpi.com/product/deckorators/index.htm) rail connectors (**Figure 8**). I also notch it in the center for the 2x2 intermediate cable support (**Figure 9**). The notch — easily made with a sliding miter saw set to the proper depth — prevents the 2x2 from rotating; and a 4 1/2-inch HeadLok screw (FastenMaster; 800/518-3569, fastenmaster.com) through the underside of the bottom rail into the 2x2 secures it in place. (I love

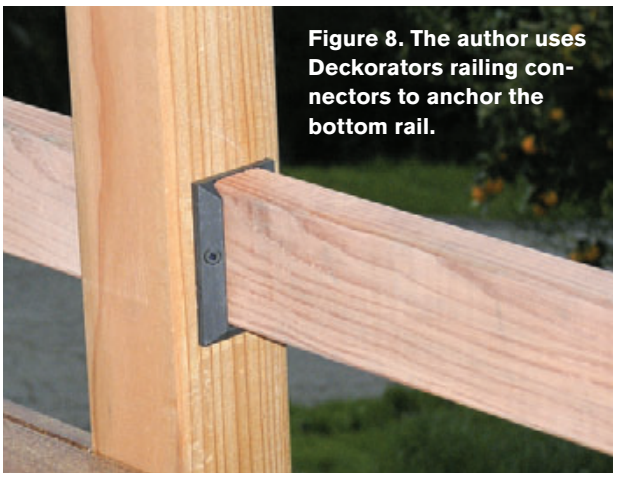

Figure 8. The author uses Deckorators railing connectors to anchor the bottom rail.

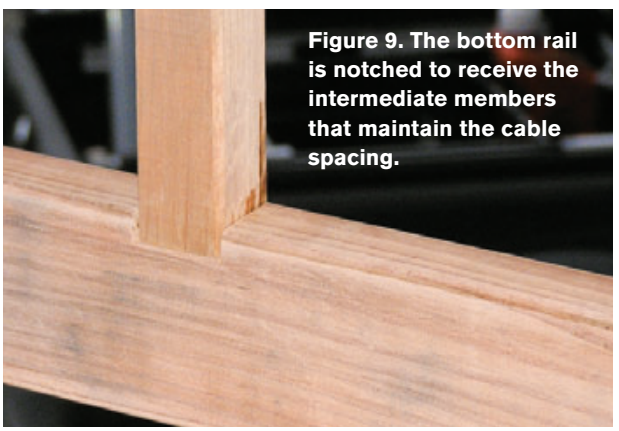

Figure 9. The bottom rail is notched to receive the intermediate members that maintain the cable spacing.

Figure 10. Using a 2x4 template, drill holes in the posts 3 inches apart for the cable to run through.

Figure 11. Begin running the cable by inserting the threaded end through an end post.

Figure 12. Make sure enough thread protrudes to start a nut and washer.

these screws and always have various lengths available on every project.) Then I use the Deckorators rail connectors to attach the bottom rails to the posts — usually 3½ inches above the deck. I plumb the 2x2 and screw a 3-inch deck screw down into it from the top of the sub-rail. I fasten the cap rail last, which for appearance is usually the same material as the decking, though often thicker.

Running the Cable

I drill the holes for the cable in the posts and intermediate supports using a 2x4 template that's cut to fit between the rails and drilled to space the cables evenly and as close to 3 inches apart as possible (**Figure 10**). Clamp the template to the post, and using a ¼-inch bit for ⅛-inch cable, drill the holes straight and level. If you have trouble, drill partway through, then move the template to the other side of the post and drill back to connect the holes. The second approach takes more time, but it also minimizes splintering.

The posts at either end of the cable run are treated a little differently from the intermediate ones. In the post at the start of the run, you'll need to drill larger-diameter holes to accommodate threaded terminal rods. At the other end of the run, you'll need to countersink the holes for quick-connect fittings.

After all the posts are done, add a piece of scrap as a stop on the template to allow you to use it to drill the 2x2s. In this case, I added a 1-inch ripping to the edge of the template.

Wherever you change directions with the cable, whether for stair angles or changes in the railing direction, you will need to use protector sleeves to prevent the cable from digging into the wood. It's easiest to put them in as you string the cable; if you put them in prior to running the cable, you'll undoubtedly run the cable into the sleeves' edges and knock them out. Just be sure not to forget them.

Now it's time to string the cable. I start at the bottom, but you could start at the top as well. The cable comes rolled in a coil. Stretch out one line at a time, and if you have multiple lengths make sure you grab the right one. One end of the cable comes with a threaded rod attached; the other end is bare cable. Insert the threaded rod into the end post, from the cable side (**Figure 11**). Allow enough rod to stick out beyond the post to enable you to put on the washer and nut (**Figure 12**). You'll tighten the nuts later.

Feed the loose end of the cable through the other posts and the intermediate supports. When you come to an angle change, pass the cable through the hole in the post, slip a protector sleeve over the cable, and tap it into the hole. Continue stringing the cable through the holes, making sure you are in the correct hole each time.

Hopefully, you will have a little extra cable when you reach the last post. Take a moment and look around. This is the

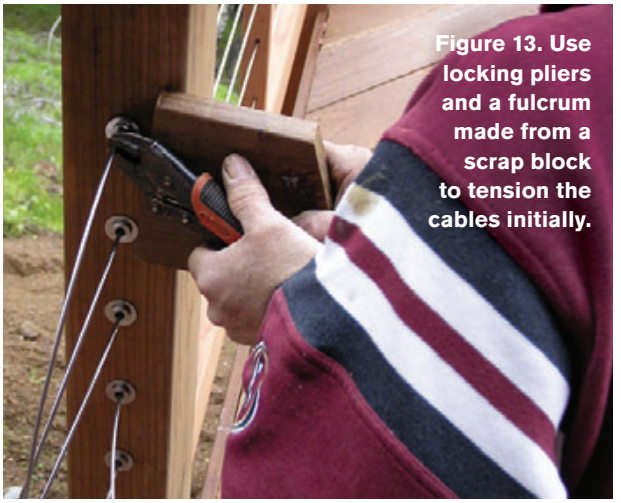

Figure 13. Use locking pliers and a fulcrum made from a scrap block to tension the cables initially.

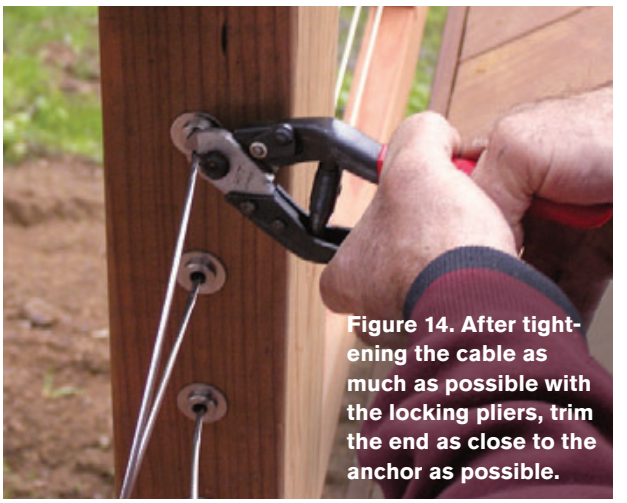

Figure 14. After tightening the cable as much as possible with the locking pliers, trim the end as close to the anchor as possible.

last chance to make sure the last hole is countersunk for the quick-connect fitting and that the cable runs through all the correct holes before you install the permanent quick-connect end fitting. Double-check that you've added protector sleeves wherever needed.

Once you're confident, push the cable through that last post. Six inches through the post is plenty; if you have more, you might want to cut off the excess. Push the end of the cable through the quick-connect fitting. The cable will slide right through, but you will not be able to pull it back out of the connector. Tap the connector into your countersunk hole and pull the cable tight. Repeat this process with the rest of the cables — one at a time, so as not to get confused about which cable goes in which hole.

Figure 15. Go back to where you started and finish tensioning the cables by tightening the nuts.

Tightening the Cables

This is the finish line. All the cables have been strung, and it's time to tighten them. Grab a loose end with a pair of locking pliers, and with a scrap of wood between the pliers and the post, lever the pliers to pull the cable as tight as you can (**Figure 13**). If the run is a long one, or there are corners, have someone else pulling with locking pliers along the way. When you have pulled out as much slack as you can, cut the cable as close to the connector as possible (**Figure 14**). Later, this will allow you to tap the end cap over the connector and the wire. Repeat the process with the remaining cables.

Go back to the start of the cable run, and tighten the nuts to remove all the slack (**Figure 15**). Start with the cable at the midpoint in your railing height, and alternate cables above and below the center cable. You'll probably need your locking pliers on the other side of the post to keep the cable stud from twisting. If you have a 4-inch sphere available, try to pass it through the midpoint of the cable run — if you can't, you're good to go. And if you "play the guitar" on the cables, they should all play the same note.

All that's left is to install the caps. You'll have to cut off any threads exposed beyond the nut. A reciprocating saw with a metal-cutting blade works fine for this. Tap the caps on and you're done.

I return to the site later, after the posts have shrunk and the cable has stretched, to re-tension the cable. Pop the caps off the rod end with a screwdriver. A slight turn of the nut should be all that's necessary to retighten the cable. ❖

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