



HOW-TO BOOKLET #3111

DECK RAILINGS & STEPS



TOOL & MATERIAL CHECKLIST

- Lumber & Boards
- Lag Screws/Bolts/Nails
- Hammer/Saw
- Square/Level
- Tape Measure
- Chalk/Chalkline
- Metal Brackets
- Marking Pencils

Read This Entire How-To Booklet for Specific Tools and Materials Not Noted in The Basics Listed Above

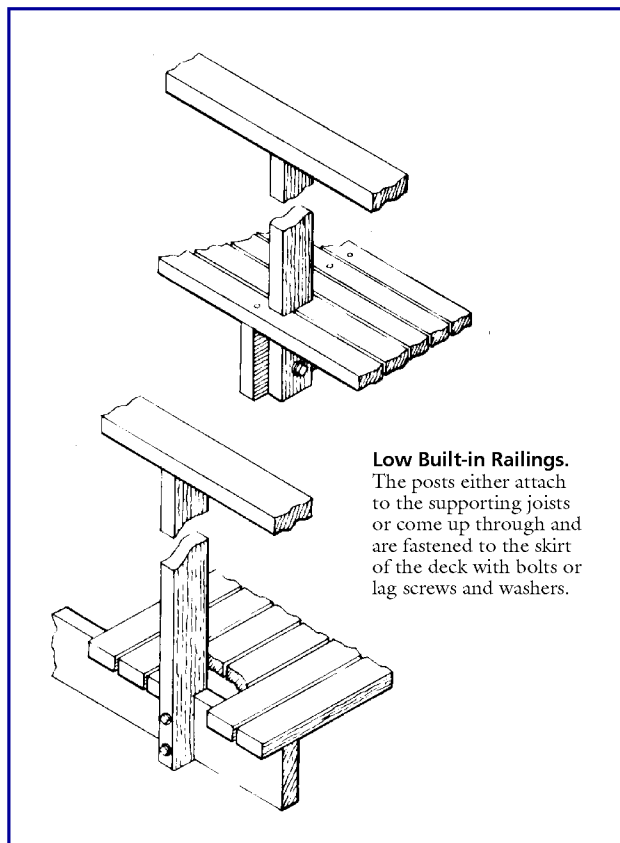
Steps are more functional to a deck than railings, which add a final finishing touch to the deck. There are several different methods in building steps; there are many patterns of railings from which to choose, most of them offering both beauty and safety.

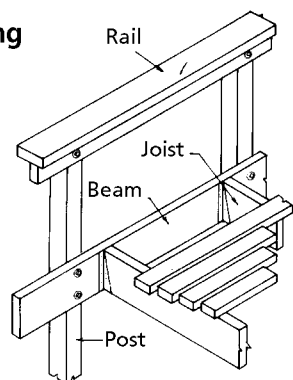
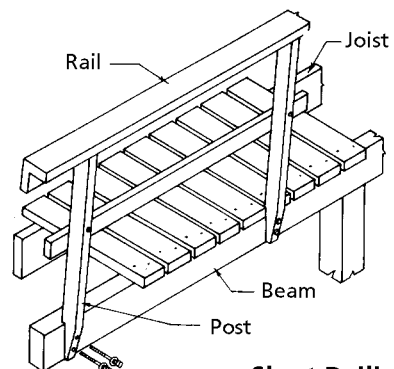
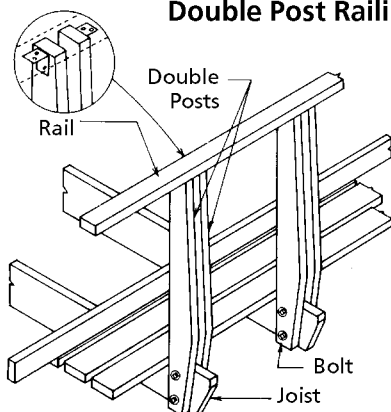
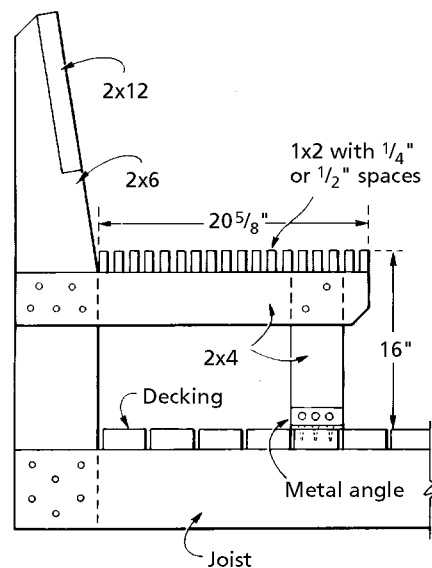
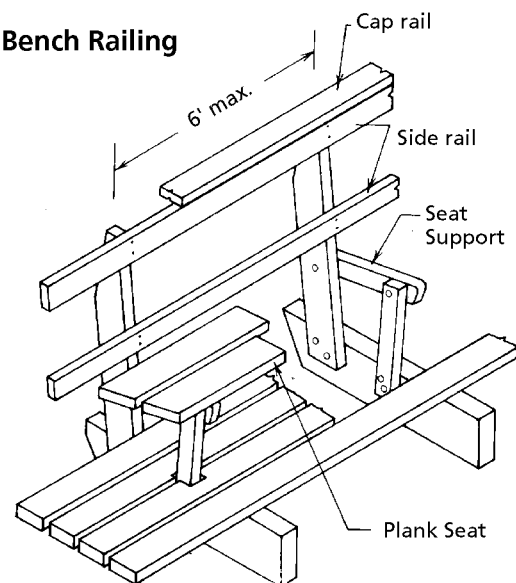
DECK RAILINGS

Building codes in your community may dictate the required height of a railing on your deck. Be sure to check with the local Building Department before you buy materials and start work. As a rule of thumb, any deck 24 inches above finished grade level requires a railing. Railings built of 4x4 posts and 2x4 rails are an excellent combination and will meet most codes.

There are several methods used to support a railing. One method is to extend the deck support posts and use the posts for the prime railing support. This technique is detailed in How-To Booklet No. 3110—Basic Decks. All this method requires is longer posts around which the decking boards are fitted. The beams and joists are assembled in the same way.

A second method, and perhaps the best way, is to attach railing posts directly to the exterior skirt of the deck. For this method, measure the post size from the bottom part of the skirt to the desired rail height.



Post Railing**Double Post Railing****Slant Railing****Bench Railing**

Laying out the location of all posts depends on the spacing of the support posts, normally 48 inch on center, and the length and type of the railing material you want to use. Alternatives are illustrated in some of the drawings in this booklet.

Railing Basics. At the corners of the deck, locate a post on each face of the corner, about 4 to 6 inches back from the corner. This will simplify the mitered corner connection of the railing.

Once you have marked all the dimensions on the skirt, install the posts using galvanized stove bolts, carriage bolts, or lag screws. Also use washers under the bolt heads and nuts of these fasteners. Keep the heads to the outside. Once the posts are fastened to the skirts, the horizontal railings may be installed.

When you choose posts for size, take into account that you will be placing a 2x6 (probably) over the end of the post. This “capping” works effectively to align the posts and provides a good nailing surface. Install a side rail around the outside of the posts flush to the underside of the cap railing. The side rail can then be bolted; use two fasteners per post—even three fasteners “staggered” if you have enough room.

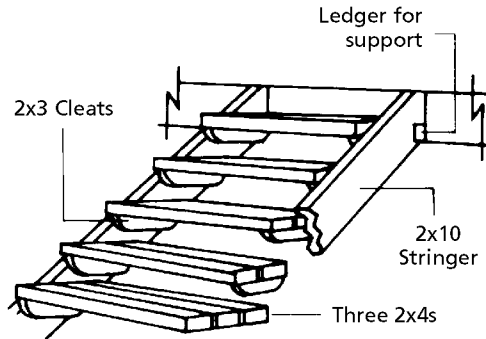
A lower side rail then may be added at the desired height and bolted in place the same way as the side rails were fastened. Make sure that the side railings butt flush with each other at the corners or the job will look unfinished.

The railing posts also may be used for deck benches, as illustrated. The benches should be about 16 inches high with seats 18 to 14 inches deep. Use the railing as a support for the seating, with 2x4s on the inside to support the other face.

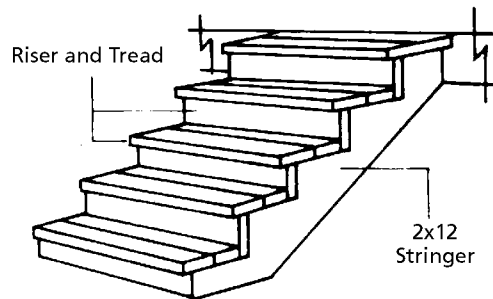
STEP BASICS

Stairs should be used to connect the deck with the ground, especially if the deck is more than 12 inches above the ground level.

Steps on Cleats



Steps Sawed Into Stringers



Stairway (top) uses an open stringer. Treads rest on cleats and are nailed to the cleats and the stringers. Stairs (below) use cut stringers to support the treads.

Stairs can be 4, 5, and 6 ft. wide. If you plan to install a stair in the deck design, it is best to postpone the installation of the decking in the area of the stair until the stair has been installed. This will allow you to build from above rather than from underneath. However, if the deck is finished and you are adding a stair, the construction techniques are not all that much different or difficult to do.

This How-To Booklet will present a method of construction for a laminated stair.

Components. The sides of the stairs are called “stringers” or “carriages” and must be strong enough to support the heavy loads imposed by people walking on the treads. Each step consists of a tread, which is the horizontal piece, and the riser, which is the height between treads.

For decks use a rise of 6 to 7 inches and a tread of 10 to 12 inches. To determine the number of risers, measure the distance from the finished deck surface to the ground. If the ground falls away, measure to the lowest spot possible.

Divide the distance in inches by 6 or 7 inches of rise. If you get a whole number, then that is the number of risers you need. In the event the number is not even, round it off to the nearest whole number. Then divide the original distance by that number to find the height of each riser. Try to keep this height about 6 to 7 inches. For example, if the deck-to-ground measurement were 48 inches, you would require eight risers of 6 inches each or seven risers of 6 inches. To determine the total run of the treads, multiply the tread width times the number required. In the example above, since eight risers were required, you would need eight treads of 10 inches each, for a total of 80 inches (6 feet, 8 inches) measuring from the face of the skirt down to the ground.

The stringers for the stair should be very strong. Use 2x10s or 2x12s for short runs—less than 6 feet. If longer than 6 ft., use 2x12s and reinforce the notched stringer with an additional unnotched 2x12.

Once the tread and rise has been determined, start marking the pattern onto the stringer. You will need a pencil and carpenter’s square. Mark the tread horizontally on the stringer and then the riser, vertically. Repeat the procedure so the end of the square for each rise coincides with the adjacent end of the tread you have just marked. For each tread and riser, reposition the carpenter’s square and continue marking until you have completed the number required.

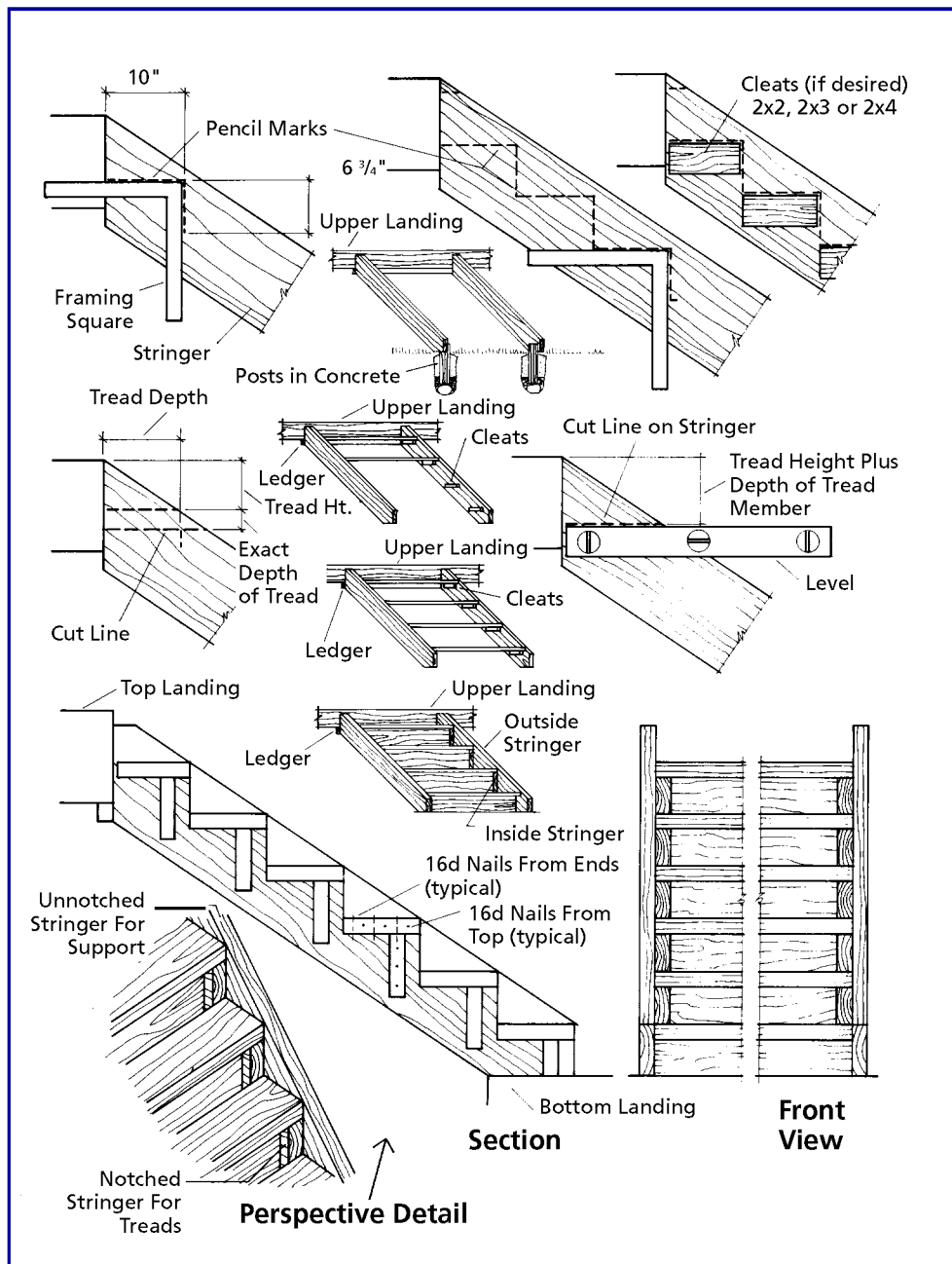
Make sure that you leave at least four additional inches remaining on the end of the stringer for attaching it to the footing or ground. Following the lines you have marked onto the stringer, cut the marked pieces. Your cuts must be square and true, otherwise you could have an irregular tread. If you need to double up because the run is over 6 foot., attach another stringer that has not been cut to the outside of the one already cut. This will give you an extension to which you can nail the next notched stringer, and provide the additional stiffness.

The Connection. Connect the stringers to the skirt. The best way is to use metal hangers or framing straps. This will guarantee that the stringers will be stable and tight to the skirt.

Before attaching the stringer, you may want to position a concrete footing under the stringers to prevent shifting. Angle irons and bolts can be used at the ground connection.

To find the location of the first tread, measure down the height of the riser, after subtracting 1 1/2 inches for the 2x4 decking, e.g., if the riser is 6 inches, mark off 4 1/2 inches. Then move down 2 9/16 inches, the dimension of a 2x3 on edge, which will be laid across the stringers to form the tread. If the tread is over 3 feet wide, 2x4s laid on edge must be used. This then would require that the top of the stringer be 3 1/2 inches below the top of the decking.

If you are not using a laminate stair, adjust this dimension so that it equals the height of the tread. The top of the stringer can be trimmed to allow for this adjustment. Making sure that the 2x3s (2x4s) are cut to length accurately, insert them one against the other, nailing as you go. Use hot-dipped galvanized nails. When you get to the end of each tread, finish it with a uniform pattern of nails. The end piece, called “nosing,” is highly visible. One variation is to put a 1/8 to 1/4 inch spacer between the studs laid on edge. This will create a pattern similar to that of the decking. Once all the treads have been installed, nail the sides of the studs through the stringer.



Ground Exit. If the last step down exits to the ground rather than to another deck surface, nail on the lowest cleats 2 inches from the top edge of the stringers, flush with the cut on the end of the stringers, and square from this cut.

Beneath each cleat tack a piece of 4x4 on end (like a short post), flush with the cut on the stringers. Tack the spacer to the cleats. Square the stringer at the deck skirt, level the spacer, and plumb the stringer cut. Finally, set the 4x4s in concrete you mix, or use pier blocks.

Other Options. Many home center stores and building material outlets stock precut stair stringers. Usually, the stringers are “short run,” but if your deck measurements qualify, these stringers could be a perfect fit saving you the time and trouble of laying out the notches and cutting them perfectly square.

Another option, if you don’t trust your measuring and cutting ability, is to have a millwork company make the stringers for you. Take the measurements, as detailed above, to the millwork shop. Once cut, you simply fasten the stringers in place and nail on the treads, as illustrated and detailed in this Booklet.

Still another option is metal steps that you can buy commercially, or have them fabricated by a metal-working shop. Or, you could form the steps and place concrete in the forms. Neither the metal nor the concrete may have the design factors that you are seeking, however. Take the deck design into consideration before making this optional decision.

Measuring, layout, and cutting details for deck stairs are illustrated throughout this drawing. See the text for procedures. Whether you use cleats or notched stringers for the tread support, the measuring procedure is the same. Since stairs get lots of heavy usage, it is best to “over-build” them so far as material dimension is concerned. Use 2-inch lumber regardless of rise.