



Concrete stairs, wrought-iron rails, and a blue-stone and cedar facade make an attractive entrance for this professional office building.

Concrete Stairs

Overcoming your fear of forming... it's as easy as building with wood

by Richard Cooley

I learned how to build stairs the hard way—by trial and error. Through building many camps for friends and additions for relatives, I learned the advantages of making the first and last riser the same as the rest, the benefits of treated lumber, and other fine points.

When I later became a professional builder, I thought I knew all I needed about exterior stairs. But occasionally a customer would request concrete stairs.

There's no need for that," I'd tell them. "I can do it with treated wood." "What about weeds growing up through?" they'd ask.

"No problem. We'll put black plastic under them, and maybe wood kickers too. That'll keep the weeds out."

"What about water? I don't want slippery stairs."

"No problem. We'll slap on indoor-outdoor carpet."

"What about snow and ice? How will the carpet hold up to me chopping the ice?"

"Look, I think what you need is concrete stairs," I'd finally agreed.

So I learned how to build professional-quality concrete stairs. It's no harder than making a wood stair. The principles are the same—if you can

build wood stairs, you can do concrete.

The simplest way to form stairs is from above. By this I mean the forms are completely above and exterior to the stairs. With this method you will need none other, whether you're pouring in the great outdoors, or between walls as is often the case in a cellar entrance. The case shown here is outdoors, because it's easier to see.

Layout

The height of the riser is determined, as in any other stair, by dividing the total rise by the number that gives you an allowable and desirable riser height, accounting for headroom, where necessary. For outdoor use, a smaller riser is nice. I like to keep the risers around 7 inches, with a tread width of 12 inches. This is a shallow stair that is safe and easy to climb.

Codes generally allow risers to be up to 8 or 8 1/4 inches, but this is a tall step, especially for commercial uses. For short rises of two or three steps, like around a pool, or wider landscaping applications, a shallow 6-inch stair is attractive.

A back-sloping riser makes the stairs more comfortable to climb.

About 1 1/2 inches of back slope is good in a 7-inch rise.

Draw the desired layout onto the stringer form, as if you were making conventional basement stairs. Similarly, lay out a mirror image on the opposite stringer form. The difference is that you're laying out what will become the outside of the form—not the inside as in basement stairs. But this will not affect your layout.

Cutting

Cut the tread lines at a 45-degree angle to the face of the stringer. The angle allows space for the trowel when finishing the concrete. You'll be cutting from the outside of the form, so keep in mind that the saw angle must be going up towards the inside of the forms when in final position.

Notice that a conventional circular saw and a worm-gear saw cut at opposite angles (see Figure 1). This is handy for doing the mirror image stringers (see Figure 2). If you have only one or the other saw then you'll have to transfer the tread layout to the inside of one stringer form, remembering that a 45-degree angle through 1 1/2 inch stock will shift the

inside layout 1 1/2 inches higher. The riser layout won't change, though.

The riser cuts on the stringer form are cut at 90 degrees. The riser form boards themselves (see Figure 3) are ripped with a 45-degree angle along the bottom edge. Make them whatever width you've determined for the risers in your layout (measure square edge to long point on the 45-degree cut).

The form is then nailed together. It looks like a stair without a tread and is now ready to be set in place. Once it's in place, you'll need to level and square it.

Form or backfill the sides of the stair and underneath. If the stair is between block walls, then you'll have to form underneath to control your volume of concrete. You can also backfill with sand.

On the job shown in the pictures, we dumped and tamped sand for backfill, then set the form at the desired location. We used 3/4-inch plywood to

corner. A broom finish adds traction to the treads in wet or icy weather. We plant a soda bottle, top down, at the appropriate points for the handrails. The bottles can be broken out later and steel handrails cemented in. We seal the concrete to protect it from calcium and other salt de-icers.



Figure 3. Riser forms are ripped with a 45-degree cut at the bottom to leave room to trowel the tread below.



Figure 1. Worm-gear and conventional circular saws cut at opposite angles—very handy for cutting mirror-image stringers.

form the sides and tamped down sand outside of them to keep them from blowing out (see Figure 4).

For thickness, I keep the pour 8 to 10 inches thick at the back of the steps, which is the thinnest point. A stair needs to be thicker than a slab, because if it wants to crack, it will tend to do so at the stress points at the back of each step. Some mesh or rebar is a good idea. If the stair does crack, this keeps it from separating. On this job, we used Dura-Wall from the job site for reinforcement.

Placing the Concrete

As in walks, we use a 4,000-pound mix, with small or pea stone. You'll need a dry mix—about a 3 1/2- to 4-inch slump is good. Too wet and it will push out of your forms when you try to finish it; too dry and it's hard to work. It should be stiff enough that it's hard to get down on the shoot, even at about a 30-degree angle. Once the forms are filled, the concrete will have to be settled to get the bubbles out from against the forms. A vibrator is nice (required on state jobs, here), but rapping with a hammer will also do.

With the angles you cut on the forms, you can trowel right back to all exposed edges (see Figure 5). Finish the front of each step with an edger to round the



Figure 4. We used 3/4-inch plywood for the side forms, holding them in place with tamped sand. Sand also filled in below the stairs.



Figure 5. After finishing the treads, the plywood is pulled and the area is ready for landscaping.



Figure 2. Mark stringer forms on the outside and cut towards the inside. Tread cuts are at 45 degrees.

Don't Be Shy of Concrete

The forms, like stairs, can be made up in the shop—a good project for rainy days.

As basement stairs, they are bombproof. They take on heavy appliances or tools without worry or danger (or liability) of failure.

Outdoors, the mix with landscaping beautifully. They can also be finished with fieldstone treads or pebbles to match different schemes.

Don't shy away from concrete stairs because they seem complex or time-consuming. Nor should you be limited to what you can order pre-cast. The ability to deliver custom concrete stairs quickly and competently will add to your reputation and to your customer's satisfaction. As for the stairs, they will outlast most of your customers. ■

Richard Cooley is a building contractor in Schenectady, N.Y.