

Q I need to pour a 4-inch-thick concrete patio slab that's 15 feet square. Can I mix and pour enough concrete fast enough with my electric mixer to do the job before the concrete hardens?

A John Carroll, a mason and a builder from Durham, N.C., responds: A 15-foot-by-15-foot slab would take close to 3 cubic yards of concrete. That's about the most I'd ever want to mix on site. So if at all possible, I'd order the concrete from a ready-mix supplier (see "Mixing Your Own Concrete," Dec/19).

Keep in mind that concrete weighs 2 tons per yard and that your working time is limited. As soon as the dry ingredients are mixed with water, they begin the unrelenting and irreversible hardening process. If that process gets away from you, the pour can become a real nightmare.

On a recent project, I used my mixer to mix up one cubic yard, which took eight mixer batches over about an hour and a half. As I mixed each batch, I dumped the concrete in a wheelbarrow. Then two other experienced masons took it from there, rolling the wheelbarrow to the form,

shoveling the concrete into buckets, lifting the buckets up onto a scaffold, and then pouring the concrete into a form. So, to mix 3 cubic yards on site, count on spending four to six hours just mixing the concrete. You'll need to have two other experienced workers to place and finish the concrete while you mix.

If you can't line up extra help, I'd recommend dividing the slab into four 7½-foot-by-7½-foot sections and pouring each section separately. Before you begin, make sure that you have a well-compacted, drainable base for the slab (see Pouring a Concrete Patio, below left). Start by compacting the existing soil. Then place and compact a 4-inch layer of gravel. A mechanical compactor is ideal, but a hand-held compactor also works. If you have thoroughly compacted the base, no reinforcement should be needed for the concrete, as long as no one plans on driving a vehicle over the slab.

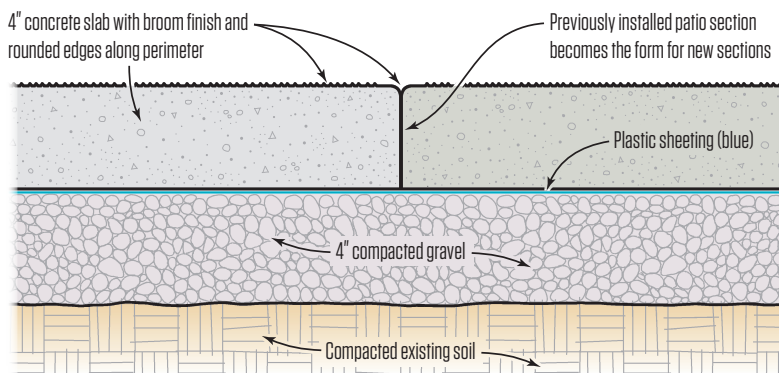
Start by forming the perimeter of the entire slab. The forms can be minimal—staked 2-bys will work fine. Next, cover the base inside the perimeter forms with 6-mil plastic sheeting to prevent water from draining out of the wet concrete, which gives you more time to place and finish the concrete.

Then use a long length of 2-by to divide the slab area into two rectangles, making sure to place the 2-by so that the interior of one section measures 15 feet by 7½ feet. Use a shorter length to divide that section to form a 7½-foot square. Now mix and pour the square and let it cure for three days. When that section has cured, remove the short form and pour the adjacent section up against the first.

After the second section cures, you should need to form only one side of the third section, using the adjacent finished section as a "form." For a slab this small, expansion joints should not be needed between the sections. I'd finish the perimeter of each section with an edging tool to round over the edges and to create a more professional look.

I would also give the concrete a "broom finish," applied by literally running a coarse broom over the surface while the concrete is still fairly wet. The broom finish adds texture to the surface to create traction for foot traffic. Leaving a slick finish is definitely not a good idea for an outside application. Not only does it increase the likelihood that people will slip and fall, it also creates a thin skin of fines that tend to flake off when the slab is subjected to freezing temperatures.

Pouring a Concrete Patio



To support the concrete patio, the existing soil is compacted along with a 4-inch layer of gravel. Plastic sheeting over the gravel prevents water from draining into the base layers. Forming and pouring smaller sections eliminates the need for control joints.

Illustration by Tim Healey

Q Do wall-mounted handrails need returns?

A Victor Staley, a building official in Brewster, Mass., responds: The short answer is yes, but let's first take a look at what the code requires for basic wall-mounted interior handrails. The Handrails section, R311.7.8, of the 2018 IRC requires a handrail on at least one side of any stairway with four or more risers. The handrail must be between 34 and 38 inches measured vertically from the nosing of the stairs—that is, the sloped plane of the stairs—and must be a minimum of 1½ inches from the wall. There are also specific regulations for the graspability of the handrail.

Reading on in the code, we come to Section R311.7.8.4, Continuity, which relates more specifically to your question: “Handrail ends shall be returned or shall terminate in newel posts or safety terminals.” The term “safety terminal” is a catch-all phrase and does not indicate a specific handrail design or component.

My interpretation of this section is that both the top and bottom ends of a handrail must be constructed so that clothing, handbags, and the like are less likely to snag on the ends of the railing when a person walks up or down the stairs. A handrail return is the easiest

and most common way of creating a so-called “safety terminal.” Most returns I see are made by turning the railing 90 degrees and making it square to the wall. On rare occasions, I've also seen designers or builders make handrail returns greater than 90 degrees as a decorative element (see photos, below).



Photos by Roe Osborn