

Build a Sturdy Stone Sitting

BY BRENDAN MOSTECKI

DRY-STACK, BUT WET IN BACK

Although it has a classic dry-stack look, each stone in this wall is actually set in mortar. Because the back of the wall is hidden, it is built with inexpensive rock and coated with a slick of cement to divert bulk water.

- Mulch
- 2-in.-thick bluestone cap
- Filler rock set in ample mortar
- Face stones
- Cement slick to divert bulk water
- Decorative-rock drip gutter
- Thick bed of mortar under first course
- Concrete pad
- #4 rebar
- Patio pavers

Wall

Keep the look of a traditional dry-stack stone wall, but strengthen the core with mortar and finish with a bluestone cap

I used to get annoyed when I heard people compare building a stone wall to assembling a jigsaw puzzle. Stone walls have no pre-cut pieces, and they certainly don't come with a picture. Then one day I sat down with my two sons to put together a jigsaw puzzle. As these things often go, they quickly ran off with the box, and I was left with a pile of pieces but no road map. That's when I realized that a stone wall wasn't so different from a puzzle after all. I start each wall by emptying and sorting a pallet of stone into four categories: base pieces, face pieces, cornerstones, and caps. I lay out the first row, establish the corners, then work in toward the middle, just like a puzzle but without the picture, of course.

I could write an entire article about different ways to build stone walls. They can be dry-stack or wet-stack (set in mortar with or without visible joints), and built either

freestanding or with stone applied to the face of concrete blocks. The stones can be round or flat, natural or chiseled, rough or smooth, and random or uniform.

For this project, my crew and I built a small retaining wall that doubles as extra seating around the perimeter of a patio. Sitting walls can be topped with large flat stones that match the face of the wall, but they don't make for comfortable seating. I prefer to cap these walls with custom slabs, in this case bluestone.

Size the base, and consider the drainage

Stone walls can be built atop a well-compacted gravel base or atop a poured concrete footing. Personally, the only time I choose a gravel base is if I'm building a dry-stack farmer's wall.

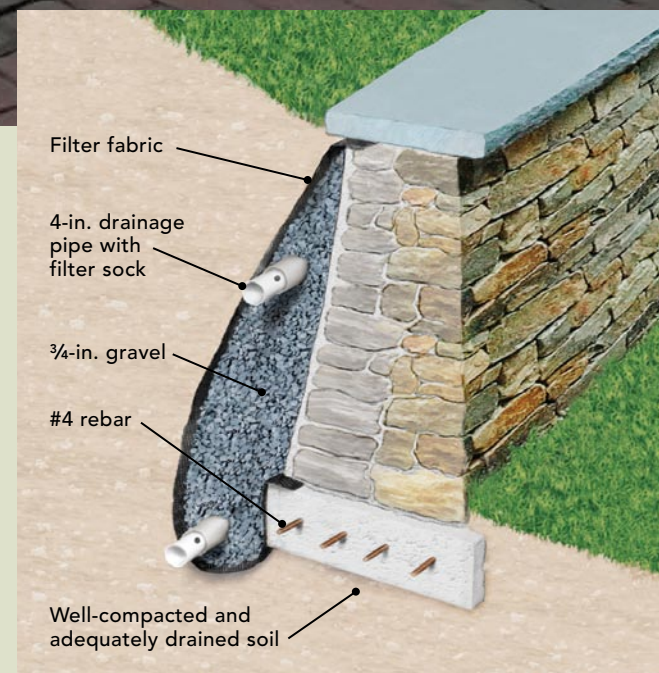
For most situations, substituting the gravel base with a rebar-reinforced concrete pad allows you to cut the

Tall walls need drainage

Because the wall in this project was only about 2 ft. tall and was surrounded by soil with a high gravel content and lots of thirsty vegetation, we didn't need a massive amount of reinforcement or additional drainage behind it. Extra drainage is, however, a good idea for walls that are taller, built over clay soil, or located in an area that sees lots of runoff. If you are unsure, don't wing it. Contact a qualified contractor or mason to help assess the site conditions.

The standard approach to drainage is a perforated drainpipe set at the bottom edge of the concrete pad and surrounded by free-draining gravel, with the whole assembly wrapped in filter fabric. Short lengths of 1-in.-dia. PVC pipe also can be placed among the stones to let out water from behind the wall.

If the wall is taller than 4 ft., it's often a good idea to incorporate drainage at both the footing and the upper part of the wall as well (drawing right). I also like to pitch tall walls backward about $\frac{3}{4}$ in. for every 3 ft. of vertical rise.



If you pick it up, put it in the wall

base depth in half. A concrete pad also helps to unify the assembly, allowing the wall to rise and fall as one unit when the ground freezes and thaws.

In most cases, a poured footing can be formed just by digging a trench, adding rebar, pouring the concrete, and letting everything set. Straight footings are the easiest, but curved footings aren't much extra work. Once I have the area cleared and leveled, I scribe the curve in the dirt, playing around with the layout until I'm happy with the shape and the flow of the wall. Then digging can begin.

If patio pavers are going to abut the stone wall, I like to form the edges of the footing with ¼-in. or ½-in. plywood, which I remove once the wall is built. This creates a smoother surface so that in winter months, the patio pavers will be less likely to collide with the wall footing and heave; it's the same principle as using cardboard Sonotubes for pier footings.

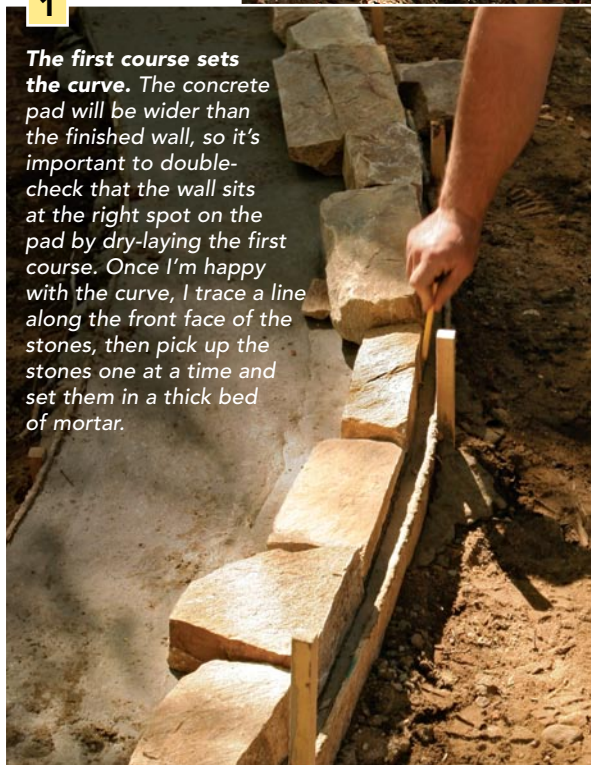
Drainage and hydraulic pressure are also concerns when I'm designing a wall. I wish there were a rule of thumb for this issue, but every installation is different. The stone wall featured here was set at the foot of a short hill; the soil both below it and behind it had lots of gravel mixed in to provide excellent natural drainage. In this case, no other drainpipes were necessary, but if a retaining wall is at the bottom of a long downward-sloping hill and doesn't have at least a perforated drainpipe set similar to a typical footing drain on a house (drawing p. 49), the buildup of water behind the stone will force the wall forward. It's also sometimes necessary to install small-diameter PVC pipes through the wall to allow water to drain from behind the stones. If you are unsure of your site conditions, I suggest calling a qualified contractor to help you assess the soil, drainage, and other factors. The same is true if you are building a wall that will be taller than 4 ft. or that will support a structure or a driveway; consult a structural engineer. These walls often need additional reinforcement and are best left to professionals.

The first course is the easiest

Once the footings have cured, I like to spread the pallets out and pick through all the stone to find cornerstones

1

The first course sets the curve. The concrete pad will be wider than the finished wall, so it's important to double-check that the wall sits at the right spot on the pad by dry-laying the first course. Once I'm happy with the curve, I trace a line along the front face of the stones, then pick up the stones one at a time and set them in a thick bed of mortar.



2

Keep it in line with string. Using the first course of stones as a guide, I drive wooden stakes into the ground at each corner and transition point, and I tie and level guide strings tautly to each stake. I prefer to tie the strings with loops so that I can move the string up as work on the wall progresses.



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3

Corners anchor the wall. The flat surface of corner-stones makes it easier to stack courses neatly, and ensures that the end of the wall is both strong and attractive. I like to establish the corners early because they require stones with at least two flat faces that are square to each other, and finding these stones takes time.



4

Aim for a dry-stack look. Once the first course is set, I place the rest of the stones, keeping the mortar toward the back where it won't be visible.



5

Pay attention to changes in height. Stone walls set on top of stepped pads are a bit less forgiving in terms of layout. Almost as important as setting the corners, these height changes must be laid out carefully to keep subsequent courses level.

Match the mix to the task



Portland cement

+



Hydrated lime

+



Sand

= Mortar

The basic ingredients in a batch of mortar are portland cement, hydrated lime (typically labeled as type-S or type-N mortar), and sand mixed with water. I vary the mix proportions depending on the task. Here are the different mixes I used for this stone wall.

Face/filler stones

- 1 bag type-2 portland cement
- ½ bag type-N or -S mortar
- 18 to 20 shovelfuls of sand
- About 5 gal. of water
- Adjust amount of sand until the mix looks smooth and fluffy.



Capstone and "slick" on back side of wall

- ½ bag type-2 portland cement
- ½ bag type-N or -S mortar
- 14 shovelfuls of sand
- 3 gal. to 4 gal. of water
- Mix to a thick, peanut-butter-like consistency.





Build up the back side. After setting a few courses of stone on the face of the wall, I build up the back side with less expensive blasted ledge stone set in plenty of mortar.



Gaps get scraps. To help create a true dry-stack look, we use the chipped-off chunks and slivers from our rock hammering to fill the spaces between stones. Ideally, these small stones will slide in deep enough to be held in place by the mortar. If not, add a bit of mortar before inserting.

and, if necessary, capstones. Cornerstones should have at least one 90° angle; capstones should be relatively large and flat on one side. When I find a stone that looks appropriate for the face of the wall, I use my bricklayer's hammer to chip off unwanted tapers and nonusable corners until the stone is ready to go. Doing this work at the pallet also keeps most of the waste away from the wall, which makes it easier to work.

I put the usable stones in a wheelbarrow and move them to the working area near the wall. I place the undesirable stones and broken leftovers in buckets to be used as backfill, as shims to prop up the main stones during installation, and later as chinking to fill gaps.

The first course of stones in this type of wall is actually the easiest because you don't have to think about the bottom, top, and sides of each stone; you need to worry only about the sides and the top because a healthy bed of mortar evens out the bottom. For this first course, I choose stones that vary in height and size, but I make sure they are flat on top. Any stones that have a flare or a slope will be difficult to build on top of, so make sure to put that side of the stone facedown. I like to lay out the whole first course before applying any mortar, which allows me to double-check my work. After adjusting any stones I'm not happy with, I mix the mortar (sidebar p. 51) and set the first course.

Stringlines help to guide the installation

Stringlines are essential for helping me to keep each course of stone level and plumb. The stringline should be set even with the front face of the first course of stones and moved up on the wooden stakes as the courses progress. I periodically check that the wall is plumb by standing above the stringline and looking down toward the base of the wall (photo pp. 50-51). This string-sighting method doesn't work as well on curved walls as it does on straight walls, so make sure also to check the curved sections with a level as the wall is built.

With the stringlines in place, I begin work on the corners and transition points of the wall, building them up to the desired finish height, then filling in toward the middle.

My last piece of advice: Don't work in one spot on the wall. Instead, grab one stone at a time, and bring it to an appropriate spot on the wall. The stones might need to be tweaked with a few blows from a bricklayer's hammer before being placed on the wall, but if you pick up a stone, install it somewhere.

After all the courses have been set, the capstones can be fabricated and installed (sidebar facing page). I prefer to leave backfilling and landscaping until after the capstones have set up completely. This allows me to run the backfill right up to the back edge of the bluestone for a smooth transition. □

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Customize the cap with a "rock and thermal" finish

Because this wall borders a patio and is meant to be a place to sit, I chose an 18-in.-deep bluestone cap. To dress up the edges, I did a "rock and thermal" finish. These finished caps can be ordered from a masonry supplier, but this service is not cheap, especially on curved caps, which require some additional steps. I prefer to do the work myself, starting with 24-in.-wide by 4-ft.-long slabs. I recommend practicing the cutting, chiseling, and torch work on a scrap before taking on the full slabs; each type of stone behaves differently. Also, this work involves lots of dust, heat, and flying shards of rock, so wear a respirator when making cuts, safety glasses when chiseling, and a full face mask and gloves when using the torch.

1 After I've laid out the slabs and cut the joints with a diamond-blade wet saw, I decide on an appropriate overhang for the front edge, typically 1¼ in. to 1½ in. so that water running off the cap won't drip onto the face of the wall. Next, I use a flexible piece of vinyl molding to transfer the curve of the wall to the capstone.

2 After making a shallow cut along the line with my angle grinder and a diamond blade, I then transfer the curve to the back of the capstones and cut both edges using a wet saw. If the curve is too tight for the saw, get close, then finish with an angle grinder. Don't worry if your cuts aren't perfect; just make sure they are square and not tapered in or out vertically.

3 The chisel work, also known as "rocking," comes next. I set one of the slabs in a bed of sand, making sure that it's fully supported to prevent cracks from the force of the chisel and hammer. I scribe a guideline about ¼ in. from the outside edge of the stone, place a chisel on the line, then strike it with the sledge in a firm outward motion. I move the chisel over, and repeat. Once all the edges are rocked, I place each slab back on the wall, using cutoffs as shims to keep them level front to back.

4 I complete the look by "thermaling" the chiseled edge of the stone to make it appear natural. First, I soak the edge of the slab with water, and then follow along with a torch to make the



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surface pop off. I prefer to use an oxygen-propane torch with a rose-bud tip and grade-T hose (www.airgas.com). A small propane torch kit (www.bernzomatic.com) can also be used for small jobs, but don't expect to get much run-time out of these smaller cylinders. The key is the right amount of heat. The torch should be hot enough that you hear the surface of the stone pop off within seconds of being touched with the tip of the flame.

To set the caps, I pour a crumbly, dry mixture of mortar on the top course of the wall, then brush a thick, gooey mixture of mortar and water on the back side of each slab before placing it on the wall. This combination of wet and dry mortar forms a durable bond. After the cap has set for 24 hours, the joints between each slab can be cut to the desired width and taped off with painters tape in preparation for jointing. Mortar is a good choice for joints in masonry surfaces that will see lots of foot traffic, but a sitting wall won't get much traffic. The wall I built for this project will be fully exposed to the harsh New England ice and snow, so I used a flexible silicone sealant.