



From Boulders to Building Blocks

How a traditional stonemason quarries and dresses sandstone

By Charles Miller

Benny Soto doesn't have to look at the chisel anymore when he dresses a block of sandstone. His hammerhead instinctively finds the butt of the chisel, sending a steady clink, clink, clink ringing around the building site. The stone chips fly about, as he transforms another ordinary rock into a hand-tooled flagstone.

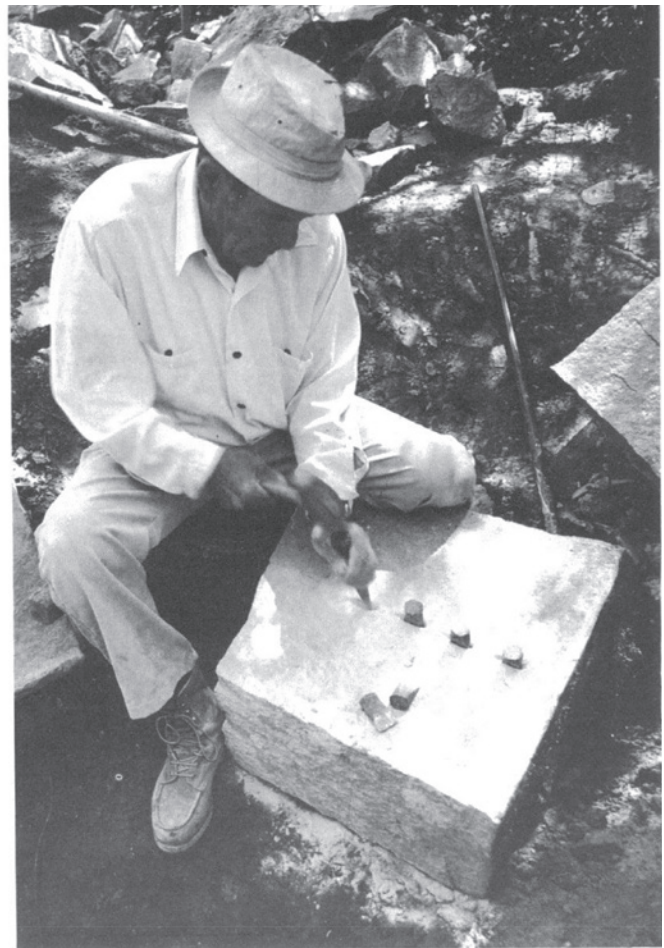
It wasn't always this easy for Soto to hit the chisel butt dead center. Sixty years ago, when he moved to Santa Barbara, Calif., from his native Guadalajara, Soto started his masonry career by lugging stones and digging ditches for a group of Italian stonemasons. Sensing that he had more to offer than a strong back, his boss urged him to learn the stonemason's trade. Soto agreed to give it a try—anything had to be better than lifting and toting rocks about all day, broken only by bouts of ditch-digging.

But the shift from hard labor to skilled craft wasn't without difficulty. Many of Soto's unpracticed mallet strokes hit the chisel butt slightly off center. The hammerhead would glance to the side, and the big knuckle on his left hand would take most of the shot. He hit his hand so many times that he developed blood poisoning, and he nearly lost his resolve to learn the trade during the two weeks that it took him to recover. But the thought of going back to the ditches was a powerful incentive, and Soto stuck with it.

The on-site quarry

Over the last 60 years, Soto has built walls of random rock, flagstone patios, fireplaces with squared-off sandstone blocks and baronial entryways topped with Scurved capstones. He quarries the stones himself, and given Santa Barbara's notoriously rocky soil, he usually needs to go no farther for raw materials than any nearby foundation trench. Some of these virgin stones are the size of beach balls, others are as big as hippos. The big boulders are easiest to work, for the same reason that you get more uniform slices from a loaf of bread than you would from a biscuit.

Although electric and pneumatic drills and chisels are now available, Soto relies on the kinds of tools that stonemasons have used for centuries. He thinks that handmade work should look handmade, and power tools (besides being too noisy) take away some of the artisan's control.



Reducing a boulder into building blocks begins with cutting it in half, then dividing the sections into ever smaller pieces. In the photo above, Soto uses a lifter to start holes for the wedges that are used to split the stone. Once the wedges are in place, he drives them into the stone with a sledgehammer. The wedges have to be hit alternately to ensure a smooth cut.

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Soto's tool bucket contains steel wedges, cold chisels and a 4-lb. hammer (photo left). The hammer has a hickory handle, which absorbs some of the shock of hitting the chisels. If the handle gets slippery, Soto roughens up the hickory on the edge of a stone. If a handle breaks, he shapes a new one to the right contours, using a piece of broken bottle as a scraper.

The chisels are of four varieties: pitching tools, points, lifters and toothed chisels. A pitching tool looks a little like a brick chisel, but its cutting edge is blunt. It's used to whack off pieces of stone near the edge of a block. A point is a cold chisel with a tip that's about as sharp as a railroad spike. It's used to excavate the holes needed to split the stones, and to dress the stone. A lifter resembles a point with a blunt tip, and Soto uses it primarily to begin the slots in the stone that will accept the wedges. The toothed chisel creates a texture on the stone's surface that resembles cross-hatching.

Sandstone

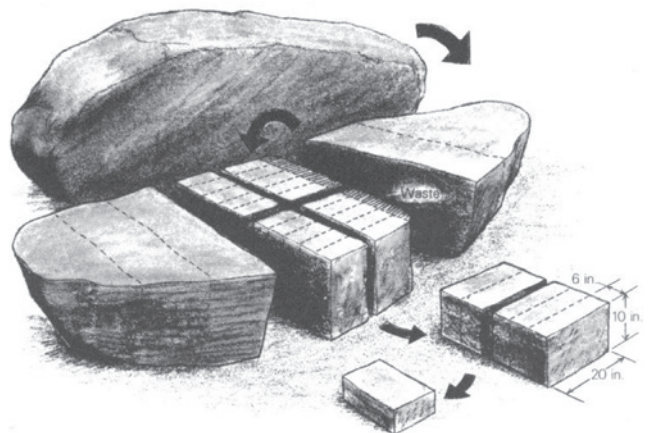
Like limestone and shale, sandstone is a sedimentary rock. Sandstones are held together by various kinds of naturally occurring cements. The yellow and reddish versions indicate iron-oxide cement. Other types can be white, black, cream-colored or even green. When sandstone breaks, the fissure usually opens through the cement, rather than through the grains of sand. This property makes sandstone relatively easy to shape.



Clockwise from top: Soto's hammer, a point, two pitching tools, a toothed chisel and a lifter. The three wedges were custom made by a blacksmith.

When Soto sizes up a rock that he is about to break into building blocks, he thinks about waste. How can he best use the rock with as little waste as possible? Soto is adamant on this point, and tries to put every offcut to use. He won't, however, reuse stones that have previously been in contact with mortar. Elements in the mortar evidently leach into the sandstone, making the stone brittle and unpredictable to cut. Soto says such stones are dead.

Quarrying a sandstone boulder is a matter of reduction. A large rock is cut into ever smaller pieces and eventually into usable blocks. Some sandstones have a grain to them, and the first cut should follow it. Typically, a boulder will be quartered (drawing, below right) and the dimension of the slices taken off the quarter-sections will be determined by the task at hand. If, for instance, Soto is making fireplace veneer blocks, which are about 18 in. long, 9 in. high, and 5 in. deep, he will make sure there is a usable 20-in. thick portion in the next slice he takes off the boulder. The excess "meat" is an allowance for a slightly erratic cut—it can be easily trimmed away when the stones are dressed. If the cut goes radically awry, chances are he will still end up with a piece of stone that has usable dimensions. If he tried to carve off a 5-in. thick piece and failed, it's likely that little of the material straight cuts when there are roughly equal amounts of stone on both sides of the cutline. Much of this quarrying process is guided by an intuition that comes only with experience.



Quarrying a boulder: Large boulders yield the best blocks with the least waste. They are typically cut in half, and a section is levered onto its side and again halved. Then slabs of the appropriate dimension are cut away from the quarter sections and reduced roughly by halves to the desired blocks. (Drawings: Chuck Lockhart)

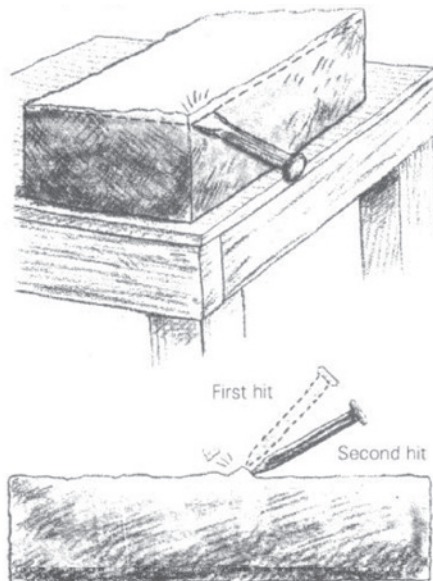


Once he has the 20-in. thick piece lopped off, he cuts it in half again. If the stone co-operates, he may now trim off the waste portion near the curved edge. If he's in doubt about the accuracy of this cut, he will split out the blocks and trim them individually. In this manner, large boulders are cleaved until they are reduced to blocks that are about 20 in. by 10 in. by 6 in.

Making the cuts

Soto begins a cut by using a point or a fat, soft pencil to mark a line on the stone. If the stone is still in the round, the line he makes is across the top of the stone, and it is straight in plan. Soto's straightedge is an ancient length of 2x2, and if he needs to square it with another line he relies on his eye.

He uses a lifter to begin a series of wedge slots along the cut line, as shown in the photo on page one.



Top: If opposite faces are not in the same plane, mark sides with parallel lines and remove excess stone with a pitching tool. Bottom: To remove surface projections, use a point held at about 45 degrees. Lower the angle for stubborn bumps.

The slots are 3 in. to 4 in. on center, and never closer than 2 in. to the edge of a stone. When each slot is about 1/2 in. deep, Soto switches to the point and excavates the slot another 1/2 in.

Now the wedges are inserted into the slots, and Soto methodically drives them, alternating from one wedge to the next, with blows from a 16-lb. sledge. Soon a fissure opens, and the stone fractures in half. If the stone is a big one, he uses a long prybar to lever one of the halves on its back.

Stone dressing

Once he has a pile of roughcut blocks on hand, Soto takes them one by one to his work table, a sturdy platform made of 2x6 braces, 4x4 legs and a 1/2-in. plywood top. It measures about 3 ft. square, and its height is about 6 in. below Soto's beltline. With a stone



A pitching chisel is used to remove unwanted material in a hurry. Here Soto uses one to clean up a ragged edge on a flagstone.

on the table, he can hold his tools at a comfortable, waist-level height without having to bend.

If he's making blocks that need regular dimensions, Soto will check the block for twists or out-of-square comers. A straight 2x2 is used for the twist test, a framing square for the corners. If a block needs trimming to bring opposite faces into the same plane or to straighten an edge, Soto marks the stone accordingly. Removing this unwanted material is the pitching tool's job. With the curved back of the tool on the side opposite the workpiece, Soto cleaves away unwanted stone with sharp raps from the hammer (photo below left). It is the pitching tool that gives the edges of the blocks the broad facets that make handhewn stone so attractive.

Any bumps and projections on the face of a block are removed with the point (drawing, below left). Soto makes this work look effortless, with the tip of the point finding the base of a projection a millisecond before the hammer strikes the butt of the chisel. Stubborn bumps get two or more hits, the first with the point held at about a 45 degree angle, and subsequent shots with the angle approaching 30 degrees.

If he's making flagstones, Soto doesn't have to worry about square corners and parallel edges. Instead, the task is to make the stones as flat on one side as possible, and then finish them with a pleasing texture that won't get slippery after years of use. For this he uses a tool called a bush hammer, which looks something like a meat tenderizer. Soto's bush hammer weighs 5 lb. and has 36 teeth on its face in six parallel rows.



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Soto lets a helper use the bush hammer, which has to be pounded over the entire surface of the stone within about 2 in. of the edges—any closer and the stone is liable to break. This work is for bruisers—15 minutes on the bush hammer will make your forearms blow up like Zeppelins. After hammering, the stone is swept clean with a stiff bristle brush to reveal a pleasing stippled texture.

Many of Soto's clients hire him to craft fireplace surrounds, hearths and mantles (photo right). Whenever he does a fireplace, he cautions the mason who installs the pieces to use a stiff mortar mix, and thereby avoid messy drips that could discolor the stone. If some mortar does get on a stone, he recommends cleaning it with a stiff bristle brush. Dip the brush in water, shake off the excess and run it over the mortar stain, but in only one direction. Back and forth will drive the stain deeper.



The weighty presence of hand-wrought stonework is entirely in keeping with the study detail in this Spanish Colonial revival style home. Soto used a plywood template to regulate the curvature of the bottoms of the corbels that support the mantel, and he shaped them with a pitching chisel.