

Patching Brownstone

by Lynette Strangstad

Brownstone is a red- to dark-chocolate-brown sandstone that was widely used as a building material in the 19th century. It is also a "soft" sedimentary rock, usually with a noticeable mica content.

Brownstone is susceptible to water damage that is often seen as too complicated and costly to repair once it begins. But don't despair. Although it does take time, there are practical and effective techniques to restore a brownstone facade.

The Problem

The most common cause of damage and deterioration is the presence of water during freeze-thaw cycles. Crumbling pointing, open joints, and cracks from settling all contribute to the problem. Water enters between stones, becomes trapped, and freezes and expands—further damaging the joints and

Along with crushed brownstone, the mix will contain portland cement and dry mortar colors. Whenever possible, include sand as a component: it will reduce the amount of crushed brownstone required.

Sand will, however, change the color and texture, so if the mix comes out wrong, change to sand of another color and/or grain size. (There's always the chance, of course, that your particular brownstone's appearance simply won't allow you to use sand in the mix.)

Begin with a white portland cement. (If you need a grayer hue, use a light-gray portland.) You can vary the color of the mix with dry masonry colors. Many masonry supply stores stock several shades of red and brown. If you can't find these colors, or if they don't quite do the job, you may have to add blue—or even yellow—to the mix. A color

brownstone, and sand. Try to match the color of the *original* brownstone, not the weathered surface. When you undercut the patch area, you'll expose unweathered brownstone; this is what you want to match.

When the patch weathers, it will eventually resemble the surrounding surface. (To speed up this process, lightly wash *only* the patch area with diluted muriatic acid after the patch has cured.)

After some trial and error, you should get a satisfactory color. Texture plays a part in our perception of color, so once you're close to matching the color, use texturing techniques on your samples. Try sponging the still-damp surface of the mix with a fine-grained sponge or a piece of foam rubber. This will expose the fine-grained aggregate and the mica.

Some brownstone blocks have streaks of an aggregate that differs in size and color from the main body of the stone. Select a sand that matches the aggregate, and toss it into the patch while the patch is still wet. This will imitate the streaks in the surrounding brownstone.

The next day, after the mix has begun to harden, prepare a solution of 1 part muriatic acid to 10 parts water. A light application of this will further expose the aggregate. (Take care not to overlap adjoining surfaces with the acid.)

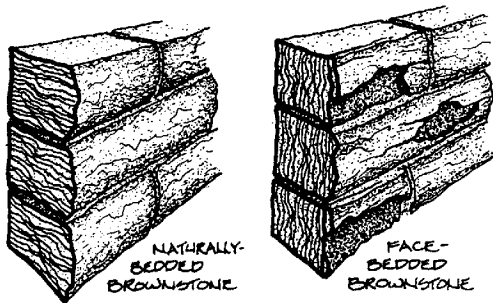
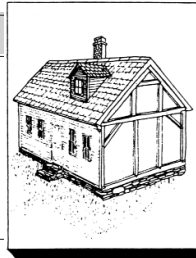
Applying the Mix

The actual patching should be done when the weather is warm. At temperatures below 40°F, the mix may not cure properly. Using masonry hand tools, cut back the stone to a solid subsurface. Undercut the perimeter of the patch to provide a key for the mix. An irregular-shaped patch will be less noticeable than one that is square.

After the deteriorated stone has been removed, drill holes approximately 1/2 inch deep by 1/4 inch in diameter. Drill them at varying angles, about every 2 inches along the newly exposed surface. Remove stone dust from the patch area and lightly spray the area with water. Then apply a bonding agent: a thin paste of 1 part portland cement, 1/2 part lime, and 3 parts sand.

Now apply the brownstone mix to fill the patch. Apply it in layers that are not less than 3/4 inch thick or more than 3 inches thick. To provide keying, deeply score the surface of each layer with a trowel. Be sure to apply each layer while the previous layer is still damp.

If the patch is deep, you can save on pulverized brownstone. Prepare a batch of mix without brownstone, and use it as a scratch coat. Only the



Naturally bedded stones (left) suffer less damage from the weather than face-bedded stones (right).

frequently the stone itself. You should not only repair the joints to keep water out, but make sure the gutters and other building details keep water off.

With some brownstones, however, preventive measures are not enough. Whether by error or intention, brownstone was occasionally face-bedded. As the illustration shows, if you face-bed a sedimentary rock, weathering will eventually allow water to penetrate the layers in the stone. This leads to delamination and the need for repairs.

Other than finding a brownstone of identical size, shape, and weathering to replace the damaged one, the only sensible way to match the color and texture is to prepare and apply a mix made from, among other things, brownstone.

Preparing the Mix

Pulverized brownstone is a necessary component of the mix. Other aggregates lack mica particles and thus look "flat" next to the original brownstone.

A salvage yard is a good possible source of brownstone. Quarries or stone yards are the next best places to try. Don't worry if the brownstone isn't crushed—you can easily pulverize it yourself to obtain aggregate of the necessary size.

wheel from an art supply store will make things easier if you have to mix colors.

Experiment first with the dry masonry colors alone, so you can see which colors are closest to what you need. Then introduce the cement,



Although spalling doesn't pose an immediate structural problem, the exfoliation of bedded brownstone layers will accelerate as water enters the rough, deteriorated surfaces.

BROWNSTONE MIX FORMULAS

You'll have to test to find the proper mix for your brownstone repairs. Listed below are some mixes I have used. There's no guarantee these formulas will work for your particular building, but they're a good starting point.

Suggested ratios for the dry masonry colors:

- A. 4 brown : 1 red
- B. 8 brown : 1 red
- C. 12 brown : 1 red

We use a basic ratio of 1 part cement to 3 parts of the mixture of brownstone, dry masonry colors, and sand. Most formulations modify that ratio to some extent, but as long as you don't stray too far from it, your mix should be strong and attractive. (Samples 4 and 5 were used on different parts of the same building.)

- 1) 15 T brownstone
5 T white portland
- 2) 12 T brownstone
4 T white portland
1 1/2 t mortar-color-mix A
- 3) 12 T brownstone
3 T white portland
1 t mortar-color-mix B
- 4) 12 T brownstone
4 T white portland
1 t mortar-color-mix C



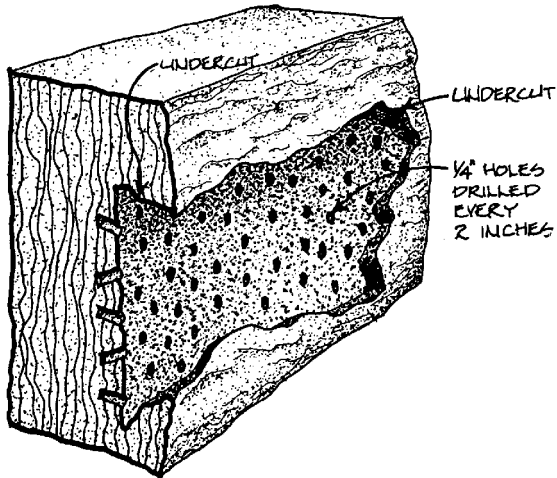
This contractor didn't do any test patches when repairing this unpainted brownstone—with spotty results.

- 5) 6 T brownstone
6 T sand
4 T white portland
% t mortar-color-mix A

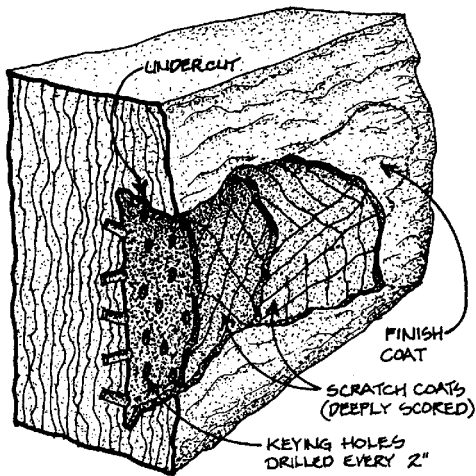
Tablespoons (T) and teaspoons (t) are convenient measurements—small enough to use a minimum of materials while still providing adequate samples for determining colors. If you keep the components in easy multiples of each other (3 teaspoons = 1 tablespoon), they translate well into larger quantities.

A final comment: Strive for perfection, but don't expect it. There is virtually no such thing as an undetectable patch. But it needn't be undetectable to be unobtrusive—and effective. ■

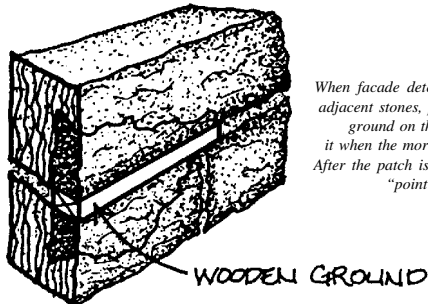
—L.S.



The deteriorated surface has been cut away to reveal undamaged stone. (An angle of about 30 degrees is recommended for the undercutting of the stone.) Keying holes have been drilled and are ready to receive the bonding agent and the first layer of mix.



If you have a deep patch, you can save on pulverized brownstone by using a scratch coat. Then apply a thin finish coat containing brownstone dust.



When facade deterioration spans adjacent stones, put a temporary ground on the joint. Remove it when the mortar is partly set. After the patch is cured, you can "point" the fake joint.

Don't hesitate to remove a less-than-perfect patch, even if it has almost cured.

finish coat need contain brownstone dust. Once the finish coat is applied and tooled to match the surrounding surface, you can use texturing techniques to approximate the weathered texture of original brownstone.

You may need to use Teflon or stainless-steel reinforcing rods for stability if you have to rebuild

architectural elements. Complex contours will require a wooden form that conforms to the negative profile of the element to be repaired.

Be fussy with your work, or today's "perfect patch" may look less than perfect tomorrow. Patching brownstone is one of those tasks where care and patience really pay off. If you take the time, you can return a crumbling brownstone facade to its former grandeur and physical integrity. ■

Lynette Strangstad worked with Structural Antiquities Unlimited on the restoration of the brownstone facade of the Theodore Roosevelt Birthplace in New York City.

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