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Masonry, Mortar and Mayhem

Tips for Maintaining and Repairing Historic Soft Clay Brick Structures

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Sashay down any street in the Vieux Carré, or virtually any historic district in New Orleans, and you will see architectural vistas of chimneys, piers and entire buildings constructed of soft clay brick, a material associated with a distant and bygone era. Unfortunately, time, neglect and inclement weather have all taken their toll on these structures. Exacerbating the problem is a serious lack of skilled craftsmen left in the area, resulting in hasty and unacceptable repairs that compromise the integrity of soft clay brick structures. Compounding the situation even further is the loss of traditional knowledge about preventative maintenance techniques. All these inauspicious factors directly contribute to the present woeful condition of our historic masonry infrastructure.

Unfortunately, masonry is a craft that is quickly dying out. This is, in part, the result of societal shifts toward quick-fix approaches that serve our fast-paced lifestyle but fail to treat original materials appropriately. Modern materials and methods have supplanted the knowledge and experience of our forebears who

understood well the ways in which masonry functions. They followed tried-and-true methods passed down from generation to generation. Our intent in this article is to provide you with a basic understanding of the lost art of masonry and the proper tools to recognize and prevent what we call “masonry mayhem.”



Improper maintenance, or a lack of maintenance, results in brick mayhem.

Background: What are bricks and mortar?

Bricks are man-made blocks formed from clay mixed with sand and fired in a kiln. Bricks made during the historic period were softer than our modern bricks because of the particular sandy clay found in the New Orleans area. Today's kilns also fire bricks at a higher temperature, resulting in a consistently harder brick. Because their composition is different, the treatment methods for modern bricks are incompatible with those for historic soft bricks.

Mortar works as a binding agent and serves as the cushion in a masonry structure. Historic mortar is a mixture of lime and sand that is slaked, or mixed, with water. Various additives improve its strength, durability and color. These could include animal hair for strength, shells (such as locally sourced oyster shells from Lake Pontchartrain) as an aggregate, and natural pigments added for color.

An appropriate lime-based mortar is vital to historic brick construction for two reasons. First, lime mortar is softer than the brick. When structural movement of the masonry occurs, the lime mortar is flexible and forgiving. If cracking occurs, it will happen along the mortar joints, as opposed to in the bricks themselves. The advantage in this case is that it is much easier to repair mortar than it is to replace bricks. Secondly, lime mortar is able to wick (or soak up) and release moisture, providing a way for the water to escape. Trapped water in bricks can lead to decay and mold growth. Remember that historic brick and lime-based mortar function together much in the same way as living organisms do. Then you can understand that it is critical that masonry be able to breathe and react with fluctuating weather systems in the natural environment.

Inappropriate modern treatments that include the use of Portland cement (a fast-setting concrete) wreak havoc with older, softer bricks, and with historic structures in general. The addition of Portland in the mortar mix can greatly diminish the integrity of the masonry by slowly crushing the bricks during natural cycles of expansion and contraction. Because rigid Portland cement does not allow moisture to escape in the way that lime-based mortars do, vegetation such as weeds, shrubs and even small trees can take root and thrive in the ample supply of trapped moisture. Without a doubt, this moisture creates an excellent environ-



Portland cement mortar results in eroded and structurally unsound brick. These bricks have lost their strong outer face in a process known as spalling.

ment for mold growth to develop and can even cause the face of the brick to crumble and fall away, technically known as “spalling.”

Keep in mind that in dealing with historic brick, it is entirely natural and acceptable for the mortar to eventually develop cracks, become loose and fall out, creating an empty gap underneath and around the brick. This simply means that the



If your mortar looks like this: a powdery, sandy white substance, do not be alarmed. The mortar has simply reached the end of its life cycle. Hire a mason knowledgeable about historic brick, and he can restore your masonry structure in a process known as repointing.

mortar has outlived its life cycle and needs replacing. This is considered to be normal, expected upkeep on historic structures. Crumbling mortar is much better than crumbling brick, a scenario that often happens when soft brick is pointed with mortar that is too rigid.

The same can be said for plastered masonry, or stucco, which is an applied coat of plaster, covering the exterior

surface of soft brick structures. Like mortar, stucco is a mixture of lime, sand, water and various additives. Masonry's first line of defense is that it has the ability to flex and dry out once it creates a bond with the surface. In our subtropical region, this layer actually helps to protect the delicate soft brick from the damaging effects of heat and humidity, while still allowing the brick underneath to expand and contract and to release moisture. Stucco too will fail and must be maintained over time. This protective coating is the brick's armor and should never be removed. As with mortar, Portland cement is too harmful a substance to use in stucco on soft brick and should not be used as a substitute for lime.

Proper masonry maintenance and repair

Now that you have a basic understanding of bricks and mortar, you will want to know the best ways to care for your masonry structures. The answer: proper maintenance. Here are some simple tips that you can do yourself, even before hiring a professional:

1. Ensure that water is directed away from the bricks. Bricks and lime-based mortar are inherently water permeable. Although they are able to shed some moisture from rain and humidity, when they are subjected to prolonged saturation, decay can occur. Be vigilant in spotting leaks

from faulty gutters and roofs and do not allow water to pool around the building foundation.

2. Don't plant vegetation too close to your brick. Rising damp (moisture from the subsoil) can be caused by

watering landscaping that is too close to brick foundations. (This can also create a superhighway for termites to breach or infiltrate the structure.)

3. Never use harsh cleaning methods, such as sandblasting or power washing, which can actually strip the brick of its outer face and weaken its structural integrity.

4. Water sealants, paint and brick do not mix. Masonry is designed to be porous, and these treatments prevent natural wicking and moisture release. Even sealants and paints that claim to be "breathable" do not allow water vapor to escape. The vapor then condenses inside the brick to form liquid water, opening a Pandora's box of problems, from spalling brick and mold, to soluble salts eroding the face of the brick. If you practice the preventive maintenance outlined above, water sealants and paints are not necessary. A good rule of thumb is to treat historic material appropriately. However, if you do wish to add color to historic masonry, a tinted-limewash is a good alternative to paint.

The major periodic upkeep required by pre-modern bricks is repointing, the process of removing crumbling mortar from masonry joints and replacing it with new mortar. Deteriorating mortar can degrade down to the consistency of sand and flaking white powder. While this can be alarming to homeowners, it can actually be a good sign: the bricks are usually still intact at the expense of the sacrificial mortar.



Some of the oldest structures in New Orleans are brick-between-post, with timber-framed exterior walls filled with soft red clay bricks. Originally, these porous bricks were stuccoed, protecting them from the elements. Unfortunately, many people like the look of exposed beam and brick, and remove this protective stucco shell, sometimes with abrasive methods like sandblasting and chiseling. This is detrimental to the brick.



A hard Portland cement mortar, incompatible with soft clay bricks, has trapped moisture and allowed vegetation to take root. Contributing to this decay is excess water accumulation caused by a faulty gutter system.





Photo by Philip Gilmore

A water sealant applied to the surface of these bricks has resulted in the loss of an entire brick's face.

Keep in mind, however, that repointing cannot be the sole solution to your masonry needs. Preventive maintenance is the first step to maintaining a healthy brick system. When brick does fail, a qualified professional cannot only identify the root cause of decay, but also determine which materials to use and how to properly apply them. Additionally, you should never attempt a repointing repair by yourself.



Photo by Liz Russell

Bricks are not intended to be painted with impermeable paints, even ones that claim to be "vapor permeable." Elastomeric and latex paints are not designed for use on organic materials that need to breathe. Notice that this paint is bubbling, because of moisture released by the brick.

Tips for hiring contractors

Whether it is a graceful towering chimney, stately piers, or a magnificent townhouse that needs repointing, finding a qualified contractor with the right background, experience and understanding of the properties of

historic brick can be a daunting process. Many well-trained traditional bricklayers have a lifetime of skill and know-how to effectively repair and repoint soft brick. Nonetheless, be aware that sometimes even reputable companies often lack trained professionals sufficiently versed in the art of repointing historic masonry. Although it may take a few years for the damaging effects from a bad repair to show, the prospect of a failed pier or chimney, or the irreparable damage to an entire masonry building, is certainly a risk worth avoiding.

You do not need to become a master mason yourself to be able to determine whether the person you interview has the ability to do appropriate repairs on historic masonry. An early discussion with the contractor regarding the mortar mixtures and application methods should reveal whether this person is capable or not. The first conversation you should have regards the mortar mixture itself. Remember: a lime-based mortar is required for soft masonry and mortar always needs to be softer than the brick. This means that a rigid application of Portland cement is inappropriate for historic soft clay brick. As soon as a prospective contractor starts talking about Portland cement or masonry concrete, listen to your preservationist alarm bells: this person may not have the qualifications needed for your project. [NOTE: Portland may have its place (in small amounts) in some mortar mixes, depending on the rigidity and age of the brick. Be advised that the verdict is still out on whether or not this is actually detrimental to the mortar and the brick. One thing is certain: the mortar must be softer than the brick.]

With a basic understanding of a few key principles regarding historic brick, you, the informed homeowner, can select a qualified professional for the work and defend against "masonry mayhem." Our historic masonry is critical to the built heritage of New Orleans. It deserves the proper care so that it can be enjoyed for generations to come.

Resources for further information

- Cleaver, Jessica. "Historic plaster exposed: What You Never Knew You Wanted to Know about Plaster," *Preservation in Print*, April 2009.
- Shetland Islands Council Guidance Note 11: Lime Mortars and Renders. <http://www.shetland.gov.uk/planningcontrol/advicenotes/documents/AdviceNote3-LimeMortarsandRenders.pdf> (Accessed March 10, 2009.)
- U.S. National Park Service. *NPS Preservation Brief 2: Repointing Mortar Joints in Historic Masonry Buildings*, by Robert C. Mack, FAIA, and John P. Speweik. <http://www.nps.gov/history/hps/tps/briefs/brief02.htm> (Accessed March 10, 2009.)

When selecting a masonry contractor, keep the following in mind

- Although not inexpensive, professional lab services can determine the precise chemical properties of historic brick and mortar components while providing you with a small sample of mortar mix that contains the correct ratios of lime, aggregates and any additives needed. At the very least, this will ensure that mortar will do no harm to the historic brick if applied correctly.
- Budget and time constraints may limit your ability to have a lab analysis performed. However, if you have a large job like a patio wall or an entire building, you may want to consider bringing in such a specialist. A brick conservator or a craftsman familiar with historic materials and techniques can do an assessment and provide an estimate. The latter should contain a detailed report explaining what mix to use for your particular brick and a plan of action, or work scope.
- Put the "A" crew on the job. A reputable company with a skilled crew, competent in restoring historic masonry, should be able to work on your old brick. Keep in mind that, especially in large jobs, it is essential that all crew members be well versed in the proper repair methods for historic masonry.
- During the process of repointing you may need to replace bricks that are crumbling with material that is like the original. Your contractor should never mix different types of brick, i.e. hard with soft. This will not only visually clash with the existing bricks, but it will undermine the structure's integrity, as each brick has its own compressive strength and will degrade at different rates.



Photo by Philip Gilmore

This picture shows an example of a sloppy mortar application.

- Masonry work can be messy. Do not smear mortar over the face of the brick and allow it to dry. Repointing should always be applied tightly with clean lines. It is especially damaging when a contractor sloppily applies a fast-drying, cement-based mortar such as Portland cement that spills onto the brick surface. The cement will dry in a matter of a few hours, necessitating

the use of a chisel to remove it and resulting in direct damage to your brick. Also, once it sets on the face of the brick, Portland cement will form additional nooks and crannies, allow water to pool and settle into the structure, and trap it there. Clean and tidy mortar joints not only affect the appearance of the wall, a tightly packed and slightly concave profile joint actually fights to prevent moisture penetration.



Photo by Liz Russell

Even worse than its sloppy application, the Portland cement mortar inappropriately used for repointing years ago has resulted in deteriorated brick piers. Also note the mix of brick types, problematic both aesthetically and in terms of different rates of decay.

In the State's article, "H. Jordan Mackenzie Residence: A Historic Blue Roof (and the house beneath it) Preserved" in the March 2009 issue of *Preservation in Print*, the new roof tile was incorrectly attributed to the wrong source. The tile used in the rehab was actually manufactured by the Ludowici Roof Tile Company of Ohio, which probably supplied the original tile as well.