

# Brick & Other Masonry Materials



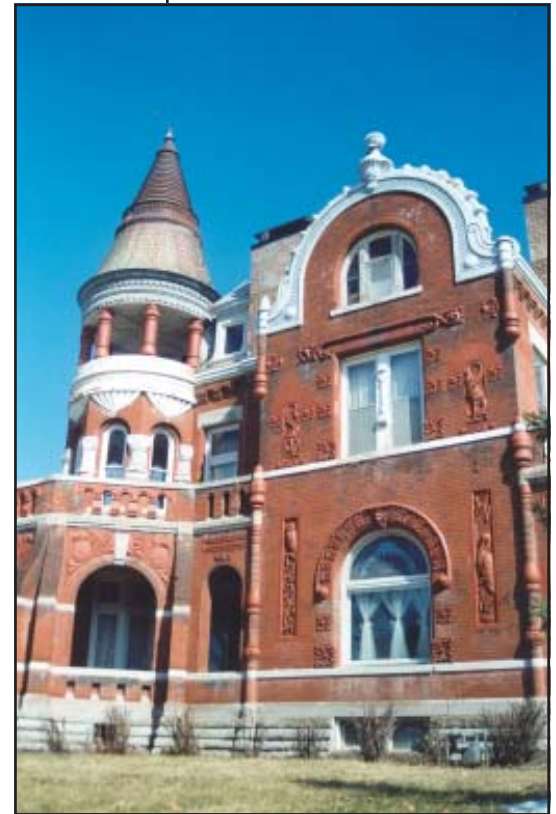
St. Joseph Landmark Commission

The majority of buildings located in St. Joseph's historic districts are constructed of masonry materials. While brick is the most commonplace material, many structures have architectural details and ornament that are executed in stone, terra cotta, and concrete. Like their wood frame counterparts, older masonry buildings require a program of regular inspection and maintenance to ensure their structural integrity.

## Maintenance and Repair

Brick and other masonry materials should be monitored regularly for signs of vegetation growth, dirt build-up, moisture damage, or cracking. Lichen, ivy, and other forms of vegetation should be removed from wall surfaces to prevent structural damage and to allow for adequate surface ventilation and drainage. Heavily soiled masonry may be cleaned with low pressure water washing and, if necessary, soft, natural bristle brushes. It should be noted that cleaning brick and other masonry materials may result in damage to the building material even if the gentlest cleaning methods are employed. Soft mortar joints may loosen and erode as a result of the water application which will result in the need for more extensive repointing. Discoloration of masonry and previous poor repairs may become more visible with the cleaning and yield an undesirable appearance. In some cases, mild detergents, chemical strippers and solvents may have to be used in combination with a low pressure water wash to accomplish the cleaning. Such chemical and detergent applications, however, should never be undertaken until tested in an inconspicuous location on the building in order to determine if any masonry discoloration or damage occurs. Avoid the use of acid-based cleaners on limestone and sandstone. Alkali-based chemical cleaners specifically formulated for stone should be used if mild detergents and water do not achieve the desired effect.

More abrasive cleaning techniques such as sandblasting or high pressure waterblasting are prohibited due to their tendency to damage the protective surface of historic masonry and accelerate its deterioration. Likewise, waterproof coatings and water-repellent sealers on brick are generally prohibited. Designed to make a masonry surface completely impermeable to water, waterproofing products often trap moisture in the brick and cause salt deposits to form on the surface. This whitening effect on the brick is known as "efflorescence" and usually can be removed with mild detergents and a soft bristle brush. Efforts should be focused on eliminating water penetration problems in above-ground masonry by correcting defects in flashings, gutters, and roof overhangs. Water-repellent sealers, which are designed to resist and repel water and not to be impervious to it, may be considered in cases where the protective outer layer of bricks has been damaged by sandblasting or other abrasive cleaning methods. Sealers may also be necessary in cases where severe spalling of the brick surface has occurred and no other means can prevent the brick from absorbing damaging amounts of excess moisture. Property owners should consider that water-repellent sealers



Pressed red brick with red-tinted mortar, terra cotta panels, and stone contribute to the visual delight of the landmark R.T. Davis mansion, 319 N. 20<sup>th</sup> Street, Harris Addition Historic District.



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Brick Mason Bob Bohot inserts new soft mortar into recently raked mortar joints at the Joseph Inslee house, 524 N. 6<sup>th</sup> Street, Robidoux Hill Historic District

may slightly change the tone and color of the masonry which may not be desired. If sealer coatings are deemed necessary, use brands that are accepted by preservation experts such as the National Park Service. A listing of such products is available in the office of the Historic Preservation Planner.

The painting or stuccoing of brick and other masonry features of historic buildings that historically were not painted or stuccoed is generally prohibited. Exceptions may be made based on the condition of the brick and the aesthetic impact of the paint/stucco application on the character of the building. Some brick buildings were also painted or whitewashed historically. If brick is to be painted, flat latex paint is recommended. Latex paint allows the brick to “breathe” and will not peel as quickly as oil-based paints, provided the surface is properly prepared prior to painting. Before repainting, the brick surface must be scraped to remove any loose or peeling paint and any deteriorated mortar joints should be repointed. When removal of paint is undertaken, use only chemical strippers and paint removal methods that are specifically recommended for masonry. Removal of paint from masonry surfaces is not recommended unless the brick is of high quality and was originally intended not to be painted. As with cleaning products, always test the product in an inconspicuous location to determine if damage or discoloration occurs.

Mortar quality has always been a major consideration for architects and builders. Mortar color, width, and profile were considered part of a building’s architectural design. Mortar holds masonry units together and also serves as the filler that compensates for small differences in the size of the masonry units to create an even, uniform wall. Both the quality and type of mortar used affect both the finished appearance and strength of the masonry wall. Most 19<sup>th</sup> century buildings were constructed of soft bricks that were bonded together with soft mortar. This soft mortar contained a high concentration of lime and sand and contained little or no Portland cement which constitutes a high percentage of modern day mortar mixes. The correct blend of lime mortar is critical to the success of rebuilding or repointing a wall made of historic brick. Too hard a mortar mix could result in the cracking and failure of soft brick units due to differences in expansion and porosity rates in the mortar and brick.

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Failure of masonry mortar is perhaps the most common problem associated with brick and other masonry construction. Mortar joints slowly deteriorate over time due to exposure to weather. This deterioration results in moisture penetration in brick walls and foundations. To correct the problem, repointing (also known as tuckpointing) is necessary. The process of replacing deteriorated mortar with fresh mortar that blends with the original treatment requires skill and patience and should generally not be undertaken by an amateur. With repointing all deteriorated and loose mortar must be carefully raked out of the joints by hand with a hammer and chisel. Electric and vibrating grinders and chisels, as well as, saws equipped with a masonry blade may be used on horizontal joints, but should only be used by the most skilled mason who has experience with such a tool. Power tools have the potential to do irreversible damage to old and fragile masonry.

Old mortar joints should generally be removed to a minimum depth of one inch (1") to ensure an adequate bond. Care must be taken to choose a mortar mixture that matches the original in terms of composition, color, texture, strength and appearance. There is not one correct mortar mixture and joint tooling for St. Joseph's historic buildings. In general, as mentioned previously, mortar mixtures were typically high in lime and sand concentrations and contained little or no cement. One mortar mixture that is recommended for pre-1900 buildings constructed of soft brick contains 9 parts sand, 4 parts type "S" lime and 1 part type II Portland Cement. When repointing, maintain the original joint profile as this may be a character-defining element of the architecture. Many of the City's finest late 19<sup>th</sup> century brick residences, for example, exhibit thin "butter joints" that often contained tinted mortars that allowed them to blend, rather than contrast with the masonry units. These joints were often highlighted with white striping for decorative effect through a technique known as "penciling". In some cases, the penciling technique was reserved for high visibility areas such as the front façade or in porch areas where they would be likely to be seen and admired. Many of the City's ashlar retaining walls contain beaded mortar joints. Take the time to study the mortar joint profiles of your building before you begin raking the mortar joints.

When brick replacement is necessary, every effort should be made to match the size, color, and texture of the existing brick. Brick courses should correspond to the original bond patterns (i.e., the arrangement in which brick headers and stretchers are laid) found in the masonry. The width and profile of joints between the brick should also match the existing masonry fabric.



Deterioration of porous sandstone is a common problem on many of St. Joseph's historic buildings. Special chemical stone strengtheners and compatible filler products can be used to halt the deterioration and to rebuild badly worn or missing architectural components.



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Masonry restoration occurs at Twin Spires Museum, 501 S. 10th Street, Museum Hill Historic District.

### Stone

Many of St. Joseph's historic buildings are ornamented with decorative stone. For many years sandstone was favored as a building material for trim and other ornamentation because it was relatively soft and easy to carve. Sandstone is a porous red, brown, or tan-colored stone that has not proven to be durable over the years. Deterioration of sandstone is often caused by excessive moisture penetration due to defective flashing, guttering failure, or deteriorated mortar joints. The combination of moisture and the effects of the freeze-thaw cycle can result in the delamination or spalling of stone layers and inevitably the loss of fragile decorative detailing. Moisture can also foster the growth of moss, lichen and other fungi on the face of the stone. Fungal growth should be removed through scrubbing with water in combination with a fungicide. Stone erosion can be mitigated by the use of special chemical stone strengtheners. Such strengtheners consolidate the outer layers of stone and allow for vapors to pass through. The patching and casting of deteriorated or missing decorative stone features can be accomplished with the use of compatible filler products. Lasting performance is best achieved when the filler is engineered to be compatible with the composition and physical properties of the substrate being repaired. Many products have synthetic polymer additives and acrylics that do not have the "breathability" properties of natural stone. Consequently, freeze-thaw cycles can result in short term failure of repairs as water vapors become trapped behind the new material and expand during cold winters causing further damage. Products that have a completely natural mineral base that allows for compatibility with the properties of natural stone should be selected.

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## Brick and Other Masonry Materials: Guidelines

1. Retain and preserve original masonry walls, foundations, and architectural features such as chimneys, decorative corbelling, cornices, porch columns and capitals, wall panels and arches.
2. Monitor brick and other masonry materials regularly for signs of vegetation growth, dirt build up, moisture damage, or cracking. Eliminate lichen, ivy, trumpet vine, and other forms of vegetation from wall surfaces and directly against foundation walls to allow for adequate surface ventilation and drainage.
3. Clean masonry surfaces with low pressure water washing (400 pounds per square inch or less) and, if necessary, mild detergents.
4. Use chemical solvent cleaners and strippers only if low pressure water washing proves ineffective. Spot test the cleaner on the masonry in an inconspicuous location to determine if any damage or discoloration occurs.
5. Avoid the use of acid-based cleaners on limestone and sandstone. Alkali-based chemical cleaners specifically formulated for stone should be used if mild detergents and water do not achieve the desired effect.
6. Avoid the use of abrasive cleaning methods such as sandblasting and high pressure waterblasting on masonry surfaces. Such methods damage the protective surface of the masonry and accelerate deterioration.
7. Avoid the use of waterproofing products and sealers on masonry as they have a tendency to trap moisture and cause efflorescence.
8. Consider the use of stone strengtheners to retard erosion of stone surfaces. Patch or cast missing stone work with breathable compatible filler products. Consult with the City's Preservation Planner for a list of recommended products.
9. Rake mortar joints a minimum of one inch (1") to ensure an adequate bond.
10. Avoid the use of power tools such as power saws and grinders to remove deteriorated mortar joints. Use of such tools should only be used by competent operators on horizontal mortar joints. Use of such tools may result in the over-cutting of the joint into the brick. Careful handiwork is required to prevent such damage to the brick during joint preparation.
11. Choose a mortar mixture when repointing a masonry wall that matches the original in terms of composition, color, texture, strength, and appearance. For softer, older brick, use a mortar mixture that has a high lime and sand concentration and low Portland Cement content. A mortar mixture that has been used in St. Joseph on pre-1900 buildings consists of 9 parts sand, 4 parts type "S" lime, and 1 part type II Portland Cement.



# Brick & Other Masonry Materials



Terra cotta stone inscribed with the date "1887" embellishes the front dormer of the August Nunning house, 1401 Jules Street, Museum Hill Historic District.

## Brick and Other Masonry Materials: Guidelines continued

12. Duplicate the width and joint profile of original mortar joints when repointing
13. Avoid painting or stuccoing masonry surfaces that were historically not painted or stuccoed. Exceptions may be made based on the condition of the masonry and the aesthetic impact of the paint application on the character of the building and surrounding historic district as a whole.
14. Use chemical solvent cleaners, strippers and applications specifically suited for masonry when removing paint. Always test the product first to avoid damage or discoloration to the masonry. Only remove paint from masonry that was intended to be exposed.
15. Match the size, color, and texture of brick and other masonry when choosing a replacement.
16. Maintain the original bond pattern of brick when making repairs and replacing deteriorated brick units.
17. Use flat latex paint when painting brick and other masonry due to its durability and adhesive qualities.