GUIDELINES FOR MASONRY

Town of Riverhead
Landmarks Preservation Commission

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Many of Riverhead's important commercial and institutional buildings are constructed of brick and stone.

These *Guidelines* were developed in conjunction with the Town of Riverhead's Landmarks Preservation Commission (LPC) and Architectural Review Board (ARB). Please review this information during the early stages of planning your project. Familiarity with this material can assist in moving a project quickly through the approval process, saving applicants both time and money.

The LPC and ARB encourage informal informational meetings with potential applicants who are considering a project that might include exterior changes to their properties. Please call the Building Department at (631) 727-3200 ext. 213.

Nothing in these *Guidelines* shall be construed to prevent ordinary maintenance of repair with like materials of similar quality and color.

Additional *Guidelines* addressing other historic building topics are available at Town Hall and on its web site at www.riverheadli.com. For more information, to clarify whether a proposed project requires LPC review, or to obtain permit applications, please call the Building Department at (631) 727-3200 ext. 213.

PURPOSE

These *Guidelines* were prepared to assist property owners with information when considering the repair, alteration or installation of masonry. It is not intended that these *Guidelines* should replace consultation with qualified architects, contractors, the Landmarks Preservation Commission (LPC), Architectural Review Board (ARB) and applicable ordinances.

The Historical Society is Colonial Revival in style and features brick walls with cast stone detailing.

EXTERIOR MASONRY

Exterior masonry provides a strong, durable and attractive appearance requiring a relatively low level of maintenance. A building's exterior masonry wall surface serves both visual and functional purposes. Exterior masonry, typically brick and stone, acts as an important visual design feature. Functionally, historic exterior masonry can act as the principal load bearing system for the building as well as its skin, shedding water and deflecting sunlight and wind. Historic exterior masonry:

- Establishes a building's scale, mass and proportion
- Acts as an important design feature, helping to define a building's architectural style
- Adds visual interest to the streetscape casting shadows and providing a pattern on the wall surface
- Can act as a principal structural system component
- Establishes a weather-tight enclosure, providing protection from rain, wind and sun
- Is affected by temperature variation and building movement

The Suffolk County Courthouse epitomizes the Greek Revival style. The columns and detailing are limestone with a similar color brick at the wall surfaces providing a more imposing and monolithic appearance.

MASONRY IN RIVERHEAD

Almost all buildings in Riverhead include some masonry in their construction. Many prominent commercial and institutional buildings are constructed of masonry, while most residences are wood framed with a masonry foundation and perhaps a chimney. As such, almost all property owners will need to address the maintenance and repair of masonry in the care of their buildings.

Many of the commercial buildings along Main Street in Riverhead are constructed of brick. Some include stone detailing such as window lintels or sills, as well as articulated building cornices of a variety of materials.

This brick chimney at this Italianate residence is articulated with banding, recessed "panels" and diamond shapes. Highly articulated chimneys and brickwork tend to be more common in Victorian period buildings.

TYPICAL CAUSES OF MASONRY PROBLEMS

The principal components of most masonry walls are either brick or stone. Mortar, which is located between the bricks or stones, bonds the individual units together, transfers the load through the masonry and provides a weather-tight seal at the exterior surface. Many problems associated with historic masonry result from the failure to keep masonry mortar joints in good repair. Deteriorated mortar joints can allow water to penetrate the masonry and cause severe interior and exterior damage. There are five principal causes of mortar joint failures:

Weathering of mortar occurs when rain, wind and pollution eat away at softer historic mortar over time. (Historic mortar was purposely soft to allow the masonry wall to expand and contract with seasonal temperature changes.)

Uneven Settling of masonry walls may result in cracks along masonry joints or within masonry units.

Temperature Cycles can cause deterioration in this climate, which is subject to extreme heat in the summer and cold in the winter. Temperature cycles can cause masonry and mortar to expand and contract at different rates, breaking the masonry's bond with the mortar. This situation can be exacerbated if moisture enters an open joint, then freezes and expands, potentially popping out the surface of the mortar and the masonry, resulting in spalling.

Poor Original Design and Materials can cause ongoing problems if the masonry and mortar are incompatible or inappropriate for their installation location, or if the masonry does not properly shed water.

Insufficient Exterior Maintenance refers to potential areas that might cause water to enter a masonry wall and contribute to its accelerated deterioration. Potential areas of concern are poorly functioning gutters, downspouts and flashing; rising damp; standing water at foundations; water splashing back off hard surfaces onto walls; or water-entrapping vegetation such as ivy or shrubs on or near masonry walls, etc.

DEFINITIONS:

Efflorescence: Water-soluble salts leached out of masonry or concrete by capillary action and deposited on a surface by evaporation, usually as a white, powdery surface

Spalling: Chipping or flaking of masonry surface

The storm water from the downspout has deteriorated the foundation's mortar, dislodging the bottom stone.

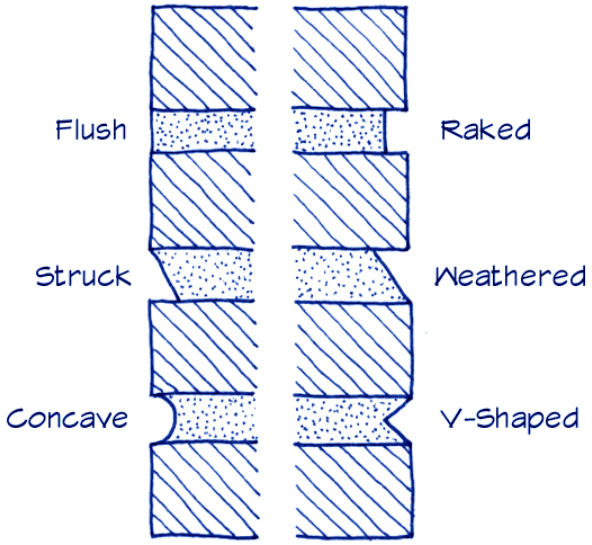
WHAT TO LOOK FOR

It is important to identify masonry problems as early as possible to minimize potential ongoing damage. This is particularly true of masonry that is exposed to a water source. Once water is permitted to penetrate a masonry wall, the deterioration will accelerate very quickly, becoming more severe and costly. Some of the signs of problems in masonry walls include:

- Disintegration of mortar more than ¼" deep from masonry surface
- Cracks in mortar, or mortar bonds broken or pulled away from masonry
- Open mortar joints
- Loose bricks or stones
- Delaminating or surface erosion of bricks or stones
- Pitted surfaces from sandblasting and abrasive cleaning
- Damp walls, sometimes evident through the growth of moss or algae, and more commonly evident through efflorescence, which is typically visible as a white powdery substance on the wall surface
- Damaged interior plaster or finishes
- Rot of wood framing along masonry walls

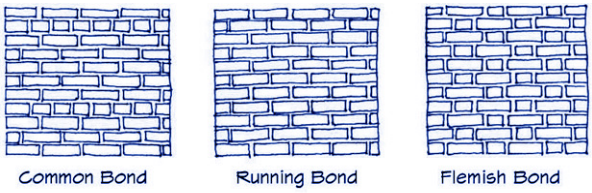
Before attempting to repair masonry problems, it is strongly recommended that the cause of the problem be addressed. This would include repairing any outstanding exterior maintenance and drainage issues.

JOINT PROFILES



There are numerous joint profile types, with each producing different shadow lines and highlights. When repointing an area of masonry, it is important to tool mortar to match the existing joint profile for a consistent appearance.

BRICK BONDING PATTERNS



Brick is commonly found in commercial and institutional buildings in Riverhead. The most frequently constructed brick bonding pattern is common bond, which features stretcher courses with a header course every 6th row. Other familiar brick bonding patterns include running bond, comprised of only stretcher courses, and Flemish bond, alternating single stretchers and headers.

STONE BONDING PATTERNS

Stone can be found at some foundations and building walls within Riverhead. Quoins are large rectangular stones located at a building's outside corners. Historically, quoins were used in a variety of bonding patterns including fieldstone and brick.

MORTAR PROPERTIES

Historic mortar is generally composed of a few simple ingredients, sand, lime and/or cement, water and possibly additives such as animal hair or oyster shells. Most pre-mixed mortars available from today's hardware stores are generally inappropriate for use on historic masonry walls because they are too hard and contains too much Portland cement.

Sand is by far the largest component of mortar and defines its color, character and texture. Historically masons would use products that were readily available; as a result sand from historic mortars tended to have weathered, rounded edges and was available in a great variety of grain sizes and shades of white, grey and yellow. Most sand that is commercially available today has sharper edges from being broken or mechanically pulverized and is sieved into standard grain sizes. To match the appearance of historic mortar, mixing of sand colors and sizes might be necessary.

Lime and Portland Cement act as binders for the mortar. High lime mortar is soft, porous and varies little in volume with seasonal temperature fluctuations. Because lime is slightly water-soluble, high-lime mortars can be self-healing, resealing hairline cracks. By contrast, Portland cement can be extremely hard, resistant to water movement, shrinks significantly upon setting and undergoes relatively large thermal movements. Portland cement is available in white or grey and the two colors can typically be mixed to achieve the desired coloration. In general, high lime mortars are recommended for nearly all historic repointing projects to ensure a good bond with original mortar and masonry. It is often possible to add a small percentage of Portland cement to a high lime mixture to improve workability and plasticity.

Water needs to be clean and free of salts, detrimental minerals and acid. If not it can break down the mortar and adjacent masonry and discolor the finished surfaces.

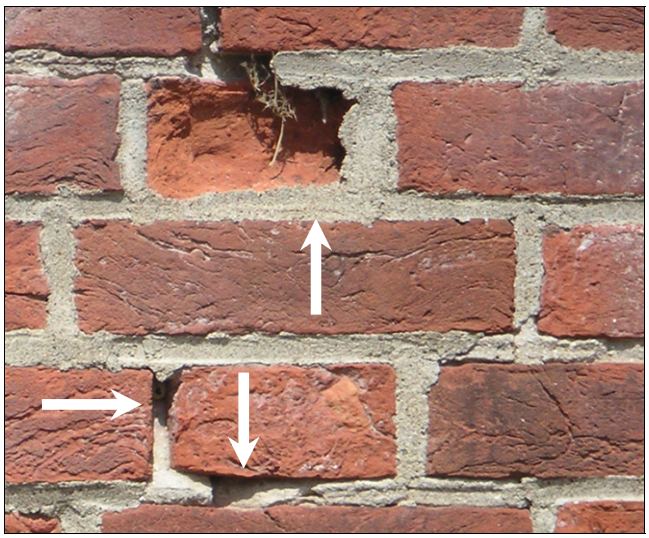
Historic Additives can include oyster shells, animal hair, clay particles, etc. To duplicate the character of historic mortar it might be necessary to include additives to match the original. It should be noted that there are several types of chemical additives available today including those that increase or reduce the setting time, expand the recommended temperature installation ranges, pigments, etc. Unless they have been specifically tested over an extended period of time with similar materials as the proposed installation conditions, the use of newer chemical additives is strongly discouraged since they can interact poorly over time.

DETERIORATED MORTAR

Historic mortar was mixed to be softer, or have less compressive strength, than the adjacent brick or stone. Because it is softer, the mortar acts as a cushion or sacrificial portion of the masonry surface as it expands and contracts through changes in temperature, moisture and differential settlement. If mortar is harder than the adjacent masonry, the stresses could be relieved through the individual stones and bricks. Cracking and spalling of the individual masonry units could occur, creating areas for potential moisture infiltration and potentially unstable or structurally compromised walls.

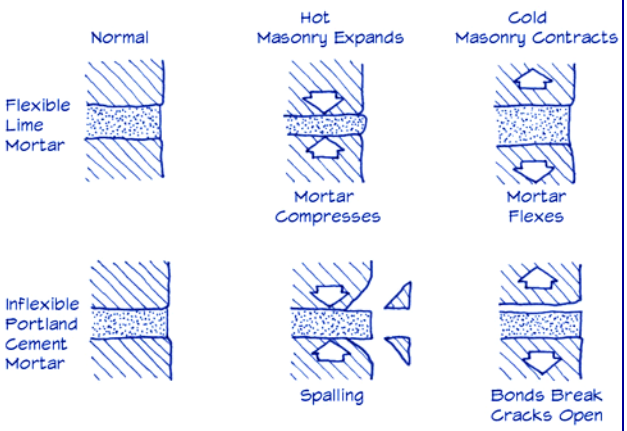
Because of its softness mortar will typically deteriorate faster than brick or stone and require more frequent replacement, while the masonry remains relatively intact. Repointing is the process of removing deteriorated mortar from joints in a masonry wall and replacing it with new mortar. With the installation of the new joints, the visual and physical integrity of the masonry can be restored.

If properly completed, repointing work can last 50 to 100 years, however, it can be time consuming and expensive. Repointing requires a great deal of hand labor by knowledgeable craftsmen to remove the existing mortar without damaging adjacent masonry, achieve the appropriate mortar mix and hardness, apply the mortar and tool it to match the historic joint style and appearance. Because of the associated costs, it is generally recommended that repointing projects be limited to areas of deterioration rather than an entire building.



The surface of the upper brick noted by the arrow has spalled. The repointing mortar is probably harder than the bricks. The mortar is also beginning to crack and pop out of the lower joints.

MORTAR HARDNESS AND MASONRY

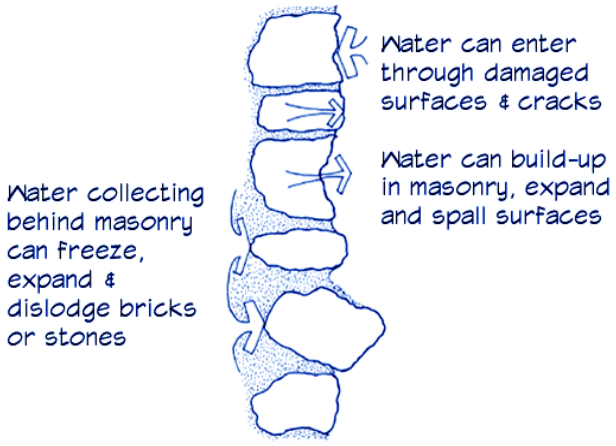


Temperature changes cause masonry units to expand when heated and contract when cold. The expansion and contraction of the masonry units results in compression and flexing of the adjoining mortar joints.

Lime based mortar is pliable and is more likely to compress and flex through temperature cycles. If properly installed, it should also be softer than the adjoining masonry allowing it to deteriorate before the adjacent masonry.

Portland cement based mortars are significantly harder than lime based mortars and far less elastic. In addition, cement mortars tend to be substantially harder than historic masonry. When masonry units expand in warm temperatures, they press against the harder cement mortar and tend to spall at the edges. During colder temperatures, masonry units tend to pull away from mortar resulting in open cracks that can allow moisture penetration.

MASONRY DETERIORATION



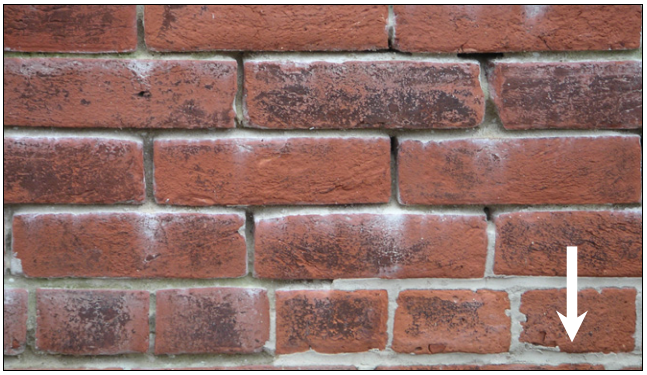
Moisture can enter walls through various ways including mortar cracks, spalled surfaces, groundwater and interior conditions. Moisture and impurities in masonry walls can cause outward pressure and result in spalling, dislodging of masonry units and deterioration of mortar joints.

The brick in-fill area is very visible and outlined by a thicker mortar joint rather than being keyed into adjacent brickwork. In addition, the infill area employs bricks of a different size and color than the historic bricks.

REPAIRING HISTORIC MASONRY WALLS

Although historic mortar will generally deteriorate before bricks or stones, individual bricks or stones can suffer damage from a variety of causes including moisture infiltration, harsh chemicals, abrasive treatments, hard pointing mortar, differential settlement, biological growth and heavy pollution.

After a brick or stone has been installed and exposed to the elements for a length of time, it develops a protective layer or crust on its outer surface. This layer provides additional protection for the interior of the masonry unit from outside elements such as moisture and pollution. If the protective layer is compromised, damaged or spalled, the unprotected and softer inner core is then exposed and the deterioration can accelerate, causing the surface to become powdery and scale off.



The mortar between the bricks has washed out particularly at the vertical joints, increasing the potential for moisture infiltration into the wall. The area at the lower right of the photograph has been recently repointed and mortar smeared over the edges of the bricks rather than tooled.

The Landmarks Preservation Commission encourages:

- Matching replacement masonry units and mortar to historic in regard to colors, textures, sizes, shapes, bonding pattern and compressive strength
- Replacement areas that are toothed or keyed into existing masonry so that the new masonry is a continuation of the existing wall pattern
- Reusing historic bricks or stones whenever possible (However, use caution when installing recycled historic bricks since they might not have been intended for exterior exposure - they might have been low-fired, softer, interior bricks)
- Retaining and repairing historic masonry details including cornices, window and door surrounds and chimneys
- Photographing and measuring existing conditions before beginning work to facilitate accurate duplication
- Careful removal of moss, ivy and other vegetation from masonry walls and shrubs adjacent to foundations
- Cleaning using the gentlest means possible (Prolonged saturation with low pressure water followed by brushing with a bristle brush is often sufficient)
- Installing a sloped mortar surface at chimneys tops to promote drainage and protect chimney walls
- Installing stylistically appropriate stone or terra-cotta chimney caps in lieu of modern metal chimney cap

The Landmarks Preservation Commission discourages:

- Replacement masonry or mortar that is harder than the original historic masonry or mortar
- Covering or removing decorative masonry
- Covering masonry with artificial siding
- Covering a historically brick or stone wall with stucco
- Painting masonry surfaces or applying water repellant or waterproof coatings that can trap moisture and prevent the wall from "breathing"
- Installing modern "antiqued" brick for patching historic masonry, since they are generally much harder and probably do not match the historic appearance
- Cleaning with harsh chemicals, sand blasting, power washing, metal brushes or grinders that can damage the protective exposed surface
- Salt to melt snow adjacent to masonry walls
- Allowing ivy or other vegetation to grow on masonry walls or dense shrubs or other plantings immediately adjacent to building foundations

MASONRY CLEANING

Appropriate masonry cleaning can enhance the character and overall appearance of a building. However, improper cleaning of historic masonry can cause damage to the historic surfaces and cause more harm than good both physically and aesthetically. There are three principal reasons for cleaning historic masonry:

- Improve the appearance by removing dirt, pollen, stains, graffiti or paint
- Retard deterioration by removing deposits, salts, efflorescence, acids, ivy, algae, moss, mildew and pollutants that can damage masonry surfaces
- Clean select areas to match historic masonry or mortar or to assess surface condition

Masonry cleaning methods fall within three general categories:

- Low pressure water, with the possible use of gentle detergent and brushing
- Mechanical cleaning including sand blasting, power washing, grinding, sanding, wire brushing
- Chemical cleaning

Because of the potential damage to historic surfaces, cleaning should be completed using the gentlest means possible. In many cases, soaking the masonry with low pressure water can remove much of the surface dirt and deposits. If the soaking method is not successful, it might be necessary to add a non-ionic detergent or brush the wall surface with a natural bristle brush.

The use of mechanical methods, including abrasive blasting, power washing, sanding or grinding, can potentially remove decorative details and the protective surface of the masonry resulting in an eroded surface and permanent damage. Abrasively cleaned masonry usually has a rougher surface that can hold additional dirt and be more difficult to clean in the future. Chemical based cleaners can etch, stain, bleach or erode masonry surfaces. Both mechanical and chemical cleaning methods can also make the masonry surfaces more porous and deteriorate mortar joints, allowing for increased moisture penetration.

The Landmarks Preservation Commission encourages:

- Cleaning using the gentlest means possible
- Making sure mortar joints are sound and building is water-tight before water cleaning
- Using water without traces of iron or copper that can discolor masonry
- Conducting water cleaning a minimum of one month before freezing temperatures to minimize the potential for spalling
- Minimizing water pressure to reduce potential etching of masonry surfaces (generally no more than 100 psi)
- Using clean water without excessive salts, acids or minerals that can deposit on masonry surfaces
- Using non-ionic detergent and natural bristle brushes when water soaking is not successful

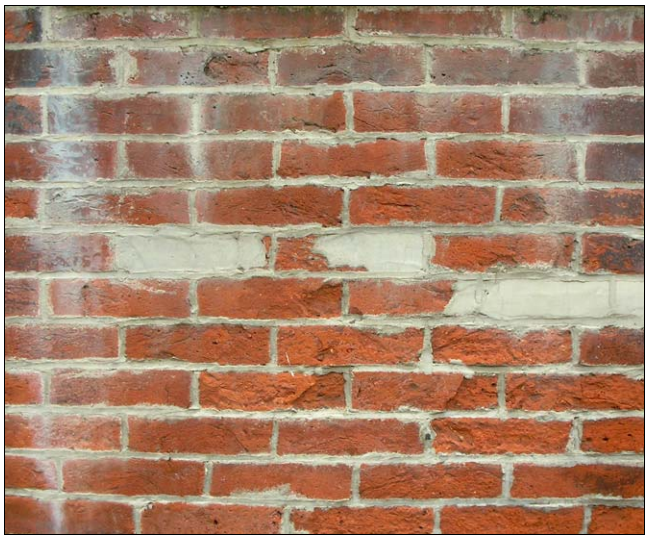
The Landmarks Preservation Commission discourages:

- Using mechanical cleaning methods including sand blasting, power washing, grinding, sanding and wire brushing
- Using chemical cleaning

In instances where a severe stain or graffiti is present, it might be necessary to use a chemical based cleaner in specific areas. Caution should be taken to test the effects of the proposed cleaner on a discrete area of the building before using it on a principal elevation. It is recommended that the most diluted possible concentration be used to minimize potential damage of the masonry surface. It should be noted that many chemical cleaners are hazardous and require special handling, collecting and appropriate disposal of the chemicals and rinse water.

The Landmarks Preservation Commission encourages:

- Hiring a contractor with specialized knowledge of masonry cleaning when gentler cleaning methods are not successful



Inappropriate treatments can damage the surface of older and softer masonry. The rough texture and uneven surface in this example suggest an aggressive cleaning method was used. Note the stucco patches and efflorescence on the surface of the bricks.

Glazed brick and terra cotta have a baked-on protective coating and can be arranged in decorative patterns and designs.

MASONRY COATINGS

Water repellent and waterproof coatings are generally applied to prevent water from entering a masonry wall, but tend to be unnecessary on weather-tight historic buildings. Water infiltration through masonry buildings is generally caused by other moisture related problems including open mortar joints and poor or deferred maintenance. In instances where the surface of the masonry has been severely compromised, such as following sandblasting, the use of water repellent coatings might be appropriate.

Water Repellent Coatings, also referred to as "breathable" coatings, keep liquid from penetrating a surface but allow water vapor to escape. Many water repellent coatings are transparent or clear when applied, but might darken or discolor over time and should be avoided unless absolutely necessary.

Waterproof Coatings seal surfaces and prevent liquid water and water vapor from permeating the surface. Generally, waterproof coatings are opaque or pigmented and can include bituminous coatings, elastomeric coatings and paint. Waterproof coatings can trap moisture inside of a wall and can intensify damage by freezing, expanding and spalling masonry surfaces. The application of waterproof coatings above the adjacent ground level should be avoided.

HIRING A CONTRACTOR

- Repair, maintenance, installation and cleaning of masonry and stucco can be potentially dangerous work and should be left to professionals
- All masons are not necessarily experienced in all materials; choose a contractor with demonstrated experience in working with historic masonry– check references for similar projects, especially from 5 years prior, to understand how well work has held up
- Verify extent of warranty for materials and labor

REMOVING PAINT FROM MASONRY

When considering whether to remove paint from a masonry surface, it is important to assess whether stripping is appropriate. In some instances:

- The building might have been meant to be painted; less attractive, softer or more porous bricks or stones might have been painted to provide a water repellent protective layer
- Paint can mask later changes or additions

Reason to consider stripping paint:

- To reduce the long term maintenance requirements associated with repainting
- Paint might have been originally applied to mask other problems such as a dirty building
- If existing paint has failed, it might be necessary to strip it before repainting

Caution should be used since some paints include lead, requiring proper collection and disposal techniques. Signs of failed paint include:

- Paint is badly chalking, flaking or peeling, possibly due to moisture penetration. It is important to find the cause of moisture and repair before repainting.
- If masonry has been "sealed" by excessive layers of paint or by waterproof coatings, the underlying masonry might not be able to "breathe" and dispel the internal moisture and salts. Eventually, pressure from moisture and salts can build up under paint layers and possibly cause the paint to peel and masonry to spall.

If paint is stable, complete paint stripping might not be necessary. However, new paint should be compatible with previously paint layers for best adhesion.

The Landmarks Preservation Commission encourages:

- Consideration about paint removal appropriateness
- Paint removal using the gentlest means possible

Funding for the Town of Riverhead Historic Guidelines and Bulk Study was provided by a 2005 award from the Quality Communities Grant Program, which is administered by the New York Department of State, Office of Coastal, Local Government, and Community Sustainability.