

REPOINTING AND PAINT REMOVAL

A CAPITOL HILL RESTORATION SOCIETY CASE STUDY
BY MARIE FENNELL, AICP

WHEN ROB AND AUDREY NEVITT BOUGHT THEIR CAPITOL HILL HOUSE

at 1000 South Carolina Avenue, SE in 1983, it was painted white. They did not consider removing the paint until they found interior wall damage from various unidentifiable water sources. In August 1999, the Nevitts stripped the loose paint off the Victorian facade. This revealed extensive mortar deterioration. After carefully considering their alternatives, they decided to strip and repoint the whole house. Now the beautifully repointed façade greets us with restored grandeur. Why did the Nevitts decide to repoint their house, and what was the process by which they achieved this fabulous restoration?

More and more homeowners on the Hill are repointing their historic brick facades, and side and back walls. The National Park Service defines repointing as “the process of removing deteriorated mortar from the joints of a masonry wall and replacing it with new mortar.”¹ It can be a slow, expensive, and messy proposition. It can also cause irreversible damage to historic brick if not done correctly. The purpose of this case study is to give homeowners an idea of what to anticipate in a repointing project. Using the Nevitts’ experience as a case study, this article will discuss the purpose of repointing, describe the process of masonry repointing in general, and identify specific issues of planning and managing a repointing project. For a more thorough discussion on the background of brick masonry and recommendations for the maintenance and repair of historic brick, please see the Capitol Hill Historic District Guideline *Red Brick, Brown Brick, Pressed Brick, and Common: Capitol Hill Brick*, by Judith M. Capen, AIA.²



Photo at top shows 1000 South Carolina Ave. before paint was stripped and house repointed. Lower photo shows the completed job.

To Repoint or Not to Repoint

The question of whether or not to repoint usually arises because of recurring water damage or obvious structural deficiencies.³ Damp walls, damaged plasterwork, or loose masonry units can all be signs of deteriorating mortar joints. Interior water damage prompted the Nevitts to begin their paint removal and repointing project. First was a period of roof and gutter repairs to keep water out of the walls. They contracted with a painting company to remove the paint from certain areas where repointing was indicated. Once the paint had been removed, however, they determined that many more areas than originally thought needed repointing. After much consideration, the Nevitts decided to repoint the whole house.⁴

In addition to restoring the physical integrity of a masonry wall, repointing, if done properly, can restore the beauty and ornamental detail of a historic brick facade. The Nevitts own a three-and-a-half-story pressed brick house with a rounded turret and ornamental brick patterns. White paint had made the forms recede, and layers of accumulated paint covered up detail. They had initially planned to repaint as soon as the scaling paint was removed and the few areas in question were repointed. After the whole house had been powerwashed, however, they began to appreciate the beauty of the original brick and its ornamental details. Now that the house has been cleaned and repointed, both its form and detail are much clearer.

Although repointing can help restore the original appearance of a house, it should be done to correct a problem and not for mere cosmetic purposes. If the paint on your house has been well maintained, you have no looming structural concerns, and you have not had any water damage, *it is better not to strip and repoint*. This is particularly true of common brick facades, which have softer brick and are more vulnerable to damage from chemicals and powerwashing than are pressed brick facades. The condition of the brick beneath layers of paint may well be poor. Perhaps it was sandblasted in the past, making it very vulnerable to weathering. If well maintained, a few layers of paint may actually help protect the integrity of the brick. Should you need another coat of paint, a non-glossy brick red is the preferred historic color.

Planning the Project



Close-up of damaged brick wall under window after paint removed.

Once you have decided to repoint, plan your project carefully. As with most construction projects, once your contractor is underway, it's hard to intervene. The Nevitts equate their project to "living on the slopes of Mount St. Helens because there is so much water, noxious chemicals, black dust and residue" [from the paint removal process and the new mortar]. While the product may be beautiful, the process is not. Consider the following before you hire a contractor:

SCHEDULING THE WORK Masonry cleaning and repointing should not be undertaken when temperatures can fall below freezing or are so high that excessive evaporation of the water in the mortar can occur. A brick wall expands and contracts with changing temperatures. Both brick cleaning and repointing require using a lot of water on the wall, and it can take a building several weeks to dry out after it's been wet. If you soak a wall and temperatures fall below freezing, you risk damaging the brick.

Repointing also should not be undertaken during extremely hot weather because water in the mortar can evaporate too quickly, changing the mortar's composition and strength. Repointing in shade on a hot day can help slow the drying process. Thus, it's best to schedule a repointing project in the spring or fall.

ESTIMATING CONSTRUCTION TIME Plan for delay. The Nevitts' contractor estimated the project would take a month from start to finish. It took two. Inevitably rain or unforeseen conditions will add time to a project. After repeated powerwashing of a small area at the building's foundation, the Nevitts learned that the area had been covered with a waterproof paint. The contractor eventually switched to a torch method to remove the paint, adding unexpected time to the project.

NOTIFYING THE NEIGHBORS You should let your neighbors know about the project's timing, projected completion date, and general maintenance issues. The work can affect a neighbor's yard, drains, and/or planned paint job. Remember that all dust that can blow around unless contained.

OBTAINING A PERMIT Since repointing affects the exterior of your house, if you're in the Capitol Hill Historic District, you must get a permit for the work. If your house was built before 1978, and you wish to remove paint, you will probably need to get a lead abatement permit as well. The need to obtain a permit for brick repointing may be news to some contractors, including those who have been working in the city for many years. While it's always been the law, due to lack of enforcement resources in the past, city inspectors have only recently been issuing stop work orders and \$500 fines for homeowners who fail to obtain a building permit.

Your application for repointing must be reviewed and approved by the District of Columbia's Historic Preservation Office before the city will grant you a building permit. The Historic Preservation Office will need photographs of the

existing exterior condition, including a close-up of a wall showing the appearance and color of the brick and mortar, and a written scope of work for the repointing project.⁵ If paint needs to be removed, as part of the permit application process, you may also need to visit the DC Department of Health's Risk Assessment, Remediation and Certification Division and complete a lead abatement permit application. You will need to provide a cost estimate and scope of work for the project. Generally, projects are reviewed and permits issued within 24 hours.⁶ For a more detailed explanation of the permit process, please see the Capitol Hill Historic District Guideline entitled, *The Hows, Whens, and Whys of Getting a Building Permit*, by Judith M. Capen, AIA, and Nancy Witherell.

MAINTAINING ACCESS Know that your project will affect circulation to and around your house. Scaffolding will be in place for an extended period of time, and you will want to avoid tracking chemicals and lead paint into your home. Furthermore, chemicals used to remove paint have irritating vapors and can burn the skin. They also tend to drip over window and door surrounds. Consider ways to maintain access while avoiding construction. During one phase of their project, the Nevitts removed a board in a back fence to maintain access and avoid having to walk through the work zone.

SAVING YOUR PLANTS The contractor will need approximately six to eight feet in front of the house for his scaffolding and supplies. If you have any plants in this construction zone, you should either replant them or find a way to protect them while the work is underway. The Nevitts were successful in protecting several of their plants by covering them with burlap. They also piled wood chips around small bushes to reduce breakage. For larger, treasured plants, you may consider building open frameworks to protect them. Areas around the base of ladders and scaffolding can have a scorched earth look when contractors are finished.

ABATING LEAD PAINT In the process of obtaining a permit for repointing, you may need to fill out an environmental questionnaire, that concerns the presence of lead-based paint in buildings constructed before 1978. Since virtually all paint used until 1978 contained some lead, it's likely that your house has layers of paint containing lead.

The scope of work you provide the permit office should describe the proposed work, including how the contractor will minimize, protect against, and clean up possible lead hazards. A responsible contractor will not use open flame to remove suspect paint. Volatile lead, put into the air by flame, can be breathed and is the most dangerous form of lead exposure. Preferred paint removal methods also minimize the production of lead-containing dust. These include wet removal systems, such as chemical paint strippers and powerwashing, and thermal systems, such as heat guns with temperatures less than 1100 degrees⁷ or heat plates. Your contractor should use drop cloths to capture lead-containing waste and brush dust off of window sills and other horizontal surfaces, cleaning it up at the end of each work day. Occupational Safety and Health Administration standards require that workers properly protect themselves when removing lead paint by wearing a mask/respirator with HEPA filters. At the end of the project, all surfaces on which lead-containing dust has settled should be washed down with a detergent, such as tri-sodium phosphate (TSP), and water.

SELECTING A CONTRACTOR Contractors can vary considerably in quality of craftsmanship and price. The best way to evaluate a contractor's work is to interview other homeowners who have worked with him and go see the work yourself. Make sure the contractor is qualified to bid on your project. Repointing historic brick buildings requires special knowledge and expertise about old brick and mortar. Discuss exactly how the contractor will prepare the building and site for work, protect neighboring properties, maintain access, and clean up lead-containing waste. It might be worthwhile to ask him to break these costs out in the overall estimate so you can question the level of effort associated with his preparation work and clean-up and ensure that you are buying the level of quality that you expect. Other variables to look for in bid comparisons are company overhead and insurance bonding.

Executing the Work



(Top) Power washing to remove loose paint starts the process. (Lower) House is draped with plastic to contain dust and windows covered for protection.

Once you have planned your project carefully, the work should move at a slow but steady pace.

PREPARING THE BUILDING Before paint stripping begins, the contractor will need to cover the windows and woodwork with plastic to protect the woodwork and avoid water entry. Since you may have plastic on your windows for several weeks, you might want to ask the contractor for translucent rather than opaque plastic. You won't be able to see out, but you will receive some light.

REMOVING THE PAINT The next step is paint removal. Removing the paint from historic brick requires a clear understanding of the physical and chemical properties of the particular brick (there are several types of historic brick on Capitol Hill). Cleaning historic materials should always be done with the gentlest means possible. There are three major cleaning methods for masonry: water, chemical, and mechanical. Sandblasting, an abrasive mechanical process that removes the exterior surface from the brick making it vulnerable to weathering and water damage, is *not* an appropriate cleaning alternative. Beware of a contractor who plans to use chemical products designed for materials other than brick.

Most contractors today use a combination of chemicals and water-pressured powerwashing to remove the paint from historic brick. The Nevitts' contractor used this combination. The chemical paint stripper, a thick gluey substance that has a consistency of wallpaper paste, turns yellow after it is applied. This is usually intended to be left on the façade for a few hours to no longer than 24 hours. It is important to understand that the chemicals are extremely caustic and can burn the skin on contact. If you happen to brush up against these chemicals, be sure to wash your skin immediately to avoid or minimize burning. Since chemicals also are characterized by strong and possibly hazardous vapors, if you need to open windows, open them as far away from the work as possible.

EVALUATING THE CONDITION OF BRICKS AND MORTAR After the building is cleaned, the next step is to evaluate the condition of the brick and determine how much repointing is necessary. The Nevitts discovered a few areas on their house where the brick was cracked or damaged. Their contractor helped them find replacement brick from the top of the chimney for these damaged areas that could be seen from the ground. By rearranging and turning the bricks various ways, they were able to improve the overall appearance of the house.

PREPARING THE JOINTS Once the paint has been completely removed, your contractor will prepare the brick joints for repointing. Most nineteenth-century mortar is made from sand and lime. As the lime leaches out over time, all that is left is sand, which must be cleaned out before the new mortar is applied. The Nevitts' contractor used grinders to pre-

pare the joints. Rob Nevitt likens the process to a dentist grinding out tooth decay prior to filling a tooth. Parts of the project required the use of a hammer and chisel, which is more labor intensive but safer for the brick.

Old mortar should be removed to a depth of least 2 to 2-1/2 times the width of the joint (approximately 1/2 to 1 inch for most brick joints). This work is noisy and creates a lot of dust. Before refilling the joints with new mortar, the contractor will need to rinse the joints with water to remove loose particles and dust and moisten the area so the masonry does not absorb all the water out of the new mortar.



(Top photo) Workers grinding out old mortar need protective gear. (Lower photo) Bricks and joints should be wet before mortar of matching color is packed into joints.

Nevitts decided to repoint their house with a black mortar after learning that their original mortar was black. Sometimes you can find original colored mortar that has not faded from sunlight at the edges of a brick wall, where the brick meets a door or window. However, matching historic mortar is not easy. Once the contractor thinks he has the mix, he should do a test sample on your brick and allow it to fully cure (dry) to make sure the match is a good one. You should request this test in your scope of work.

PREPARING THE MORTAR Repointing mortars should match the historic mortar in physical composition, color, texture, and tooling as closely as possible. This is especially important with spot repointing so the new and old mortar appear seamless to the viewer.

Inappropriate mortar color and texture can negatively affect the visual characteristics of the whole building. The best way to match the mortar's color and texture is to send a sample to a laboratory for analysis. You should try to locate several samples of unweathered mortar for analysis and compare them with new mortar.

Modern mortars contain portland cement, which is very strong, impermeable, and *inappropriate for historic masonry units*. Historic mortars, on the other hand, are made of lime and sand, making them flexible, soft and permeable. Portland cement mortars are formulated for use with modern brick that has much higher compressive strengths than historic brick. Their chemical composition and behavior is totally different from lime mortars, which are characterized by high workability and plasticity and change little in volume during temperature fluctuations.

Mortar for historic buildings should be softer and more permeable than the masonry units themselves. Historic mortars allow building stresses caused by expansion and contraction (i.e., weather), moisture migration, or settlement to be accommodated through the mortar instead of the masonry. If the mortar is harder than the masonry, the wall will not move with these stresses. If the mortar doesn't permit water vapor to migrate out, then salt crystallization will form within the masonry wall and have no escape. Since the stresses need to be relieved in some way, they will result in cracks and spalling (i.e., breaking off in chips) of the masonry itself.

A beautiful repointing job can be ruined with the wrong mortar color. *Never use white mortar on pressed brick of Victorian vintage.* Historic mortars during the Victorian period were typically red or black. Natural additives, such as lamp blacking, would have been used to achieve this color. Contractors today often add modern pigments, which come in a range of colors, to the mortar mix. The



Final powerwashing will remove bits of mortar on bricks and joint edges.

FILLING THE JOINTS When the contractor fills the joints, the joints should be wet, but standing water should not be present. The contractor will pack the joints well into the back corners. When the mortar reaches thumbprint hardness, another layer of mortar may be applied. Since the mortar shrinks during the hardening process, layering is important. When the final layer of mortar is thumbprint hard, the joint will be tooled to match the historic joint. Most of our Capitol Hill houses have standard, almost flush or slightly concave joints, however some buildings have other types, including recessed, grapevine, or scored joints.⁸

THE FINAL POWERWASHING The final cleaning of the newly repointed wall occurs after the mortar has dried but before it is initially set (1 to 2 hours). The contractor should use a low-pressure (100 psi) water washing and a stiff natural bristle or nylon brush to remove the extraneous bits of mortar on the faces of brick and at the edges of the joints.

Related Points

SPOT REPOINTING *Spot repointing* is repointing specific deteriorating mortar joints, as opposed to an entire wall. A recurring reason for spot repointing on Capitol Hill is to correct structural failures of window and door arches. Although spot repointing these areas will prevent water penetration and thus slow deterioration, the actual failure of an arch might only be prevented by rebuilding it. Victorian builders didn't always know how to tie the face brick to the structure of a building. When rebuilding an arch, you can stabilize it by using stainless steel brick ties or restoration anchors in the mortar joints.⁹ Any disassembling of the arch should be done with care, and new mortar should match the old.

Spot repointing requires careful analysis of historic mortar. It is important to match historic mortar in color and texture and examine how the new mortar weathers. Test panels are essential in order to ensure a good match between the new and old mortar, and you should include this requirement in the contractor's scope of work. Test panels should be done in inconspicuous locations. It might also be a good idea to evaluate the effects of temperature and precipitation on the test panel prior to repointing all of the areas in need. One way to plan your project is to test in the fall and repoint in the spring.

WATER REPELLENT AND WATERPROOF COATINGS OR SEALANTS Generally, the National Park Service recommends against water repellent and waterproof coatings for historic buildings.¹⁰ Masonry walls are intended to have some ability to breathe. If any water or condensation enters a waterproof coated wall, it won't be able to escape, causing a buildup of moisture that can destroy wood structural elements and interior plaster, as well as the exterior wall. Water intrusion is usually not the result of porous masonry, but instead is typically caused by deteriorated or clogged gutters and downspouts, deteriorated mortar, capillary moisture from the ground (rising damp), inadequate drainage away from the building, or condensation. Sealants will not solve any of these problems, which need to be addressed as necessary, and will usually even exacerbate them.

Sources

- Brewster, Richard; DC Risk Assessment, Remediation, and Certification Division; interview.
- Callcott, Steve; DC Historic Preservation Office; interview.
- Capen, Judith M., AIA; *Capitol Hill's Unpainted Ladies*, Capitol Hill Historic District Guideline.
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- Grimmer, Anne E.; *Preservation Brief #6: Dangers of Abrasive Cleaning to Historic Buildings*; U.S. Department of the Interior, National Park Service, Technical Preservation Services Division; June 1979.
- Lead Paint Safety: A Field Guide for Painting, Home Maintenance, and Renovation Work*; U.S. Department of Housing and Urban Development, Office of Lead Hazard Control; June 1999.
- Mack, Robert C., AIA; *Preservation Brief #2: Repointing Mortar Joints in Historic Brick Buildings*; U.S. Department of Interior, National Park Service, Technical Preservation Services Division, November 1975.
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- Mack, Robert C., AIA; *Preservation Brief #1: The Cleaning and Waterproof Coating of Masonry Buildings*; U.S. Department of Interior, National Park Service, Technical Preservation Services Division, November 1975.
- Nevitt, Robert; interview.
- Weinstein, Robert, AIA; *architrave p.c. architects*; interview.

Footnotes

- ¹ Mack, Robert C., AIA; *Repointing Mortar Joints in Historic Brick Buildings*, Preservation Brief #2.
- ² This and other guidelines are available at the Capitol Hill Restoration Society 202.543.0425.
- ³ If you see water damage and think the source may be deteriorating mortar joints, it is best to consult with a historic preservation consultant before contracting for an expensive repointing project. Identifying the source of water damage is the first step. Repointing may or may not be the solution.
- ⁴ In *Repointing Mortar Joints in Historic Masonry Buildings*, Robert C. Mack and John P. Speweik suggest if 25 to 50 per cent or more of a wall needs to be repointed, then repointing the entire wall may be more cost effective than spot repointing. Also, few contractors seem to want to spot repoint, fearing that the spot repointing may not solve the problem and the property owner will be unhappy with their work.
- ⁵ For more information on specific project requirements, contact the DC Historic Preservation Office, located at 801 N. Capitol Street, NE, 3rd floor, on 442-4570.
- ⁶ For more information on lead abatement permits, contact the Office of Risk Assessment, Remediation & Certification, at 51 N Street, NE, 3rd floor, on 202-535-2690.
- ⁶ *Lead Paint Safety: A Field Guide for Painting, Home Maintenance, and Renovation Work*; U.S. Department of Housing and Urban Development, Office of Lead Hazard Control, p. 3.
- ⁷ Callcott, Steve.
- ⁸ Weinstein, Robert, AIA.
- ⁹ Mack, Robert C., AIA; *The Cleaning and Waterproof Coating of Masonry Buildings*, Preservation Brief #1.

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