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Conservation Practice on cleaning historic brickwork and structural timber

Cleaning Brick and Structural Timber



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Introduction

Much research has gone into finding effective and practical ways of cleaning old buildings. This has stemmed partly from the damage that dirt and pollutants can cause, and partly for aesthetic reasons. The result is that there is now a large section of the construction industry dedicated solely to the cleaning of old buildings – a service which is increasingly in line with demand. Unfortunately, using a "specialist firm" is not necessarily any guarantee of quality, and experience has shown that incorrect cleaning methods are used far too often; damaging the material and leaving it vulnerable to accelerated rates of decay.

The two dominant traditional building materials in Essex are brick and timber. This leaflet concentrates on correct cleaning of these materials. Stone construction in Essex is a rarity and besides, techniques for cleaning stone have been amply documented. Likewise, the removal of paint from joinery and fittings is outside the scope of this document.

Correct cleaning techniques will vary from building to building, and will depend on factors such as the type and quality of the material to be cleaned, the extent and type of soiling and practicality of implementing a particular technique. Much time and effort will be required whatever the method chosen – old buildings will reward you if this care is taken.

When a building is listed as being of Special Architectural or Historic Interest, **ANY** works that affect its character, either externally or internally, requires listed building consent in the same way as an alteration or extension would. If there is any doubt, contact your local planning authority, who will readily advise on the matter.

Why Clean?

The most common argument for cleaning old buildings is that the appearance of the structure should be returned to its former state. This is debatable, as small amounts of soiling will not detract from its character, and the risks of damaging the structure by cleaning far outweigh the aesthetic benefits to be gained. The charm of many old buildings arises from a slightly weathered appearance, and they should be respected for what they are, not necessarily for what they could be or were.

Of far more importance is the decaying effect that heavy soiling can have. Fine water droplets will remain on the surface of the brickwork with a build-up of dirt – leading invariably to the formation of destructive salts which can spoil or disintegrate this surface.

Where salts do occur it is vital that their source is clearly identified as soiling and not, as is more common, building defects that lead to the ingress of water, eg. capillary attraction from the ground, faulty rainwater good and incorrect mortar specification when re-pointing.

Part 1: Cleaning Brickwork

Light soiling should not be considered a danger to the building. Conversely, soiling should not be allowed to build up to such an extent that its removal would be difficult, and subsequent damage to the building during cleaning more likely.

Paint or limewash applied to brickwork will naturally disintegrate after time and necessitate removal. Invariably only bricks of poorer facing quality were painted or limewashed, and therefore, re-painting or limewashing is essential. Only porous paints should be used.

Internally, brick fireplaces were generally plastered and sometimes gauged to give the appearance of stone. Where found, this detail should be left intact.

Techniques

Sandblasting

Due to its speed, cost and efficiency, this is now a very common practice, but the damage it causes has given rise to a great deal of concern. Sandblasting involves the use of selective grades of abrasive grit (usually sand), which are blown under controlled air pressure at the surface to be cleaned. Pressure pots, gun sizes, cutting speeds and coarseness and type of abrasion will depend upon factors such as the type of brick to be blasted, attention to details, extent of soiling, and cost. Blasting may be either dry or wet. Wet blasting reduces to a minimum the free dust present, but this advantage is offset by the amount of slurry generated at the wall face, which itself has to be cleaned off after blasting is finished. Tarry 'dry out' stains could be expected where there have been heavy dirt deposits.

Even the most delicate sandblasting on brickwork will remove all or part of the hard crust or skin which the brick possess, leaving the surface "pitted" and unsightly. This in turn will lead to an accelerated rate of decay. Lime mortar pointing, which could be original, may also be unnecessarily removed.

For these reasons sandblasting should be avoided.

Washing

Water is often all that is necessary to clean medium soiled buildings and should be considered essential on areas of detail. Nebulous spray washing softens dirt deposits, which can then be carefully removed with stiff brushes (not wire brushes or steel wool) and wooden scrapers.

Its main drawback is that the wall will be saturated more than any other time in its life. This can give rise to damage of internal wooden finishes, possibly leading to rot. Efflorescence, where slats crystallise on the surface of the brick, is almost certain to occur, but this is harmless and can be brushed away. Brushes of bristle or phosphor bronze are most suitable.

The amount of water used should be kept to an absolute minimum, any may be applied at intervals. Washing should never take place when frost is likely. Open moisture paths and cracks should be grouted before intensive washing. Likewise, window and door openings should be protected by tarpaulins and screens.

Medium pressure water lances can be helpful in cleaning glazed or engineering bricks, but their use should be avoided on softer bricks or where there is lime mortar pointing. Using a natural pH soap and bristle brush may help when cleaning with a water lance.

Chemical Cleaning

This is often the best way of removing heavy soiling from soft brickwork. "Weak" hydrofluoric acid (2-8 percent concentration) is very effective, and does not leave behind any harmful salts that most other chemicals cleaners do. Its advantage over washing is that less water is used. It is an extremely volatile material and should only be used in experienced hands. It is highly corrosive, can etch glass and attack painted or polished surfaces. These should therefore be protected with two coats of peelable latex or sheeting.

The acid is spray or brush applied to a pre-wetted wall, washed off, re-applied and then thoroughly washed off (possibly with the use of a water lance). The acid should not be allowed to remain on the wall too long, as colloidal silica will be formed which appears as white bloom and is difficult to remove.

Special Problems

- Rust Staining Some acids, for example a 15% solution (150g/l) of oxalic acid (rhubarb leaves), may be successful on stains of only a few months duration. Older stains are almost impossible to remove.
- Copper Staining Ammonia solutions are of some use, and will also help wash off and inhibit the re-growth of algal slimes.
- Efflorescence (Salts crystallising on brick face. These are generally seen in a dry period after brickwork has been saturated). Brush off from time to time using a bristle brush.
- Grease & Oil Staining Carbon tetrachloride applied by sponging or using a series of poultices is effective. The poultice should be whiting or one of the natural clay earth mediums available.
- Paint Solvent (non-caustic) such as strippers methylene chloride are useful in removing some paints. This is applied as a thick paste in attapulgite or sepiolite clay and then covered with a thin plastic film or propriety paste incorporating caustic soda. The poultice should be applied to a dampened surface and thoroughly washed off. There is a risk of efflorescence. Old paint can be very difficult to remove from very porous brick.
- Mortar Staining 10% concentration hydrochloric acid should remove most mortar stains.

Part 2: Cleaning Structural Timber

Most half-timbered buildings of 16th century or earlier are made of oak, with elm and chestnut used increasingly later.

Oak is a remarkably self -preserving material, requiring little attention if maintained in the right conditions. Elm and chestnut do not have these properties to the same degree, although again, in the right conditions, the wood will not decay.

As with brickwork it is important to establish the right reasons for cleaning. Some structural timer was never designed to be seen (its quality may signify this) and therefore it is not necessary to improve its appearance. Likewise, cleaning should not be carried out in an attempt to get the wood looking new again – much character and historical details is likely to be lost if this approach is chosen.

Painting of structural hardwood timbers is inappropriate in Essex as this is not traditional practice. Often this obscures historical detail and does nothing to improve the appearance of the wood. Despite this fact it is advisable not to attempt cleaning painted timbers unless the paintwork is deficient, as there is always the risk of damaging the wood with any cleaning technique. Painting should not be confused with natural ochre pigments (obtained from red earth or vegetable extract) which are traditional technique and are now quite rare. When discovered, these finishes must be carefully retained, as should any wall paintings. Limewashing structural timbers is also traditional. This is a cheap and harmless finish, used simply to improve the appearance of poorer quality wood. Its drawback is that it does need to be re-done every few years.

Softwood used for joinery and finishes of building from the late 17th century onwards was always painted – the advice given here does not apply to these.

Many medieval buildings were of an 'open hall' construction with an open hearth. This lead to soot blackening of the roof timbers. The wood will appear almost black but this is not a layer of soot adhering to the surface – it is actually embedded into the surface. It is not dirty but historically of great significance to the building and its removal should never be attempted.

Techniques

Time and effort are the essence of a properly cleaned piece of timber.

As with cleaning brickwork, sandblasting is an increasingly common technique used to 'clean' old timbers. Its benefits are the same, i.e., it is quick, cheap and efficient, but these are outweighed by the damage it causes to the surface of the timber. In addition, it does by its very nature leave the inside of the building in a mess! Sandblasting is indiscriminate, eroding maximum amounts of the softest timber and leaving the finished surface uneven. It always removes more wood than necessary, leaving an unsightly pitted surface behind. Edges of least resistance such as mouldings are often lost completely. Historical details such as carpenters marks, taper burns, soot blackening and the marks made by the carpenters original tools during the preparation of the frame may also be removed. A dry 'drift wood' appearance results whilst the natural character and quality of the timber is destroyed, leaving the surface more vulnerable to moisture absorption and dirt adherence. For those reasons sandblasting should never be used.

Paradoxically, the precision, detail and quality of timber are usually greater the earlier the building. Sandblasting destroys this precision, leaving the timbers looking 'younger' and more akin to the poorer quality timbers of more recent centuries.

Sandblasting is often required by chemical treatment firms as a pre-treatment to effect their 30 year guarantee. This is not considered advisable for the given reasons and other methods of cleaning should be used (if treatment is necessary).

Later mills and industrial buildings are framed entirely from softwood. The quick growing nature of this timber results in widely spaced annual growth rings. When sandblasted the softer summer growth is eroded faster than the winter growth, resulting in heavily etched graining. Softwood, whether structural or for finishes or fittings, should never be subjected to sandblasting.

Cleaning should be done by hand, with no mechanical intervention. Scrapers, steel wool, and sandpaper may all be useful in removing particularly stubborn patches. For oil paints, emulsions and tar, solvent strippers in conjunction with poultices can be successful. Hot air paint strippers may be used, taking care not to damage the wood with the scraper or excessive heat. This is not suitable for water based paints. Blowlamps should never be used.

When removing old limewash, brush down and wash with clean water. Stiff brushes (not steel wire) will help remove limewash embedded in grooves.

After cleaning, it may be desirable to improve or reinstate the finish of the timber. If it is to be left in its natural state, pure beeswax polish will help enhance its character. Alternatively, three thin coats of limewash may be applied. This is left to dry for a few days and then brushed down hard with a bristle brush.

Further Reading

Practical Building Conservation Vol.2 – John & Nicola Ashurst

Cleaning Stone & Brick – John Ashurt. SPAB Publication

Removing Paint from Old Buildings - Adela Wright. SPAB Publication

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