

Pointing of Brickwork

1.00 Historical Note

- 1.01 The majority of houses in Hampstead Garden Suburb are built in facing brick. Even rendered houses often have facing brick plinths or chimney stacks. The facing brickwork is generally of a very high standard and it is most important that this high quality workmanship is not destroyed by poor repointing.
- 1.02 Most of the brickwork was laid in a lime mortar with a well graded coarse sand, which was the usual technique of the time. The mortar is frequently quite soft and powdery, and people accustomed to modern cement mortars often suppose that in some way it is defective.
- 1.03 Cement was not in use at all before the 19th century and not in general use for house building until the first half of the 20th century. The early cements of the late 19th and early 20th centuries were much weaker than cement in use today. Their strength was more akin to some types of modern hydraulic lime mortars. Modern cement is very strong and is designed for making concrete. It is not designed for the type of mortar suitable for bricklaying and pointing on Suburb houses.
- 1.04 Most brickwork was finished with a 'cut off' or flush joint as the wall was built. Pointing was not carried out as a separate operation. As the brick was laid and tapped down into line, the mortar was squeezed out at the joints. A diagonally upwards sweep of the trowel cuts off the protruding mortar leaving what is basically a flush, open-textured joint. With the passage of time, these joints have probably weathered back slightly. Certainly the aggregate material of the mortar (sand and grit) will have become exposed.
- 1.05 Sometimes a "weather-struck joint" was used, running the trowel at a slight angle along the upper edge of the brick below the joint. Once again, the passage of time has softened the outlines and exposed the aggregate.
- 1.06 The weather-struck joint was used again in the 1930's by some architects, often as a separate pointing operation, and sometimes using white cement and silver sand, to give a very white mortar.
- 1.07 Two types of pointing which are common today were not used in the Suburb and have no real historical precedent. These must not be used in re-pointing:
- 1.08 The first is the "bucket-handle" or "hosepipe" joint. The action of tooling the joint produces a smooth dense surface which does not weather gracefully, but remains harsh and unchanging. The action also spreads the mortar over the edges of the bricks, giving a wider appearance which contrasts with the usual rather narrow joints of traditional Suburb work.
- 1.09 The second is the harsh weather-struck joint in which the lower edge of the bed joint actually projects in front of the brick face. This lower edge is then cut to a sharp straight edge. These joints have to be made in a dense smooth strong cement mortar, which is totally foreign to traditional work. Such pointing is actually detrimental to brickwork, particularly to the soft red brick which are widely used in the Suburb.



▲ Very bad pointing in grey cement mortar. The mortar is smeared over the face of the bricks and the work is untidy.



▲ Good pointing. Soft mortar in a pleasant buff colour is finished slightly recessed behind the face of the bricks and brushed to expose the texture.



▲ Bad cutting-out with a mechanical grinder. The bricks have been badly damaged and the joints widened.

2.00 The Visual and Mechanical Effect of Re-pointing

2.01 Of the two elements of a brick wall, bricks and mortar, the bricks should always be considered as the permanent element and the mortar 'sacrificial', or that element which will need replacement from time to time. The brick also needs to be mechanically stronger than the mortar. If the reverse is the case, the brick will become the sacrificial element and the mortar the permanent. Bricks are a porous material, as is traditional mortar. Any moisture within the wall, for instance after rain, must be able to migrate or evaporate out through the mortar. A modern hard cement mortar is virtually impervious, thus trapping the moisture in the brick, this will lead to eventual fracturing and spalling of the bricks.

2.02 Original pointing is usually in an open-textured soft lime mortar which has weathered for up to ninety years. It is very difficult to match this when re-pointing is done.

2.03 The action of raking out the joints is liable to widen those joints through damage to the edge or arris of the brick. Such damage to the bricks cannot be repaired. Raking out must therefore be carried out with great care, using tools no bigger than the width of the joint and only by hand. Angle grinders must never be used to rake out brickwork for repointing.

2.04 There are three types of lime used in building:

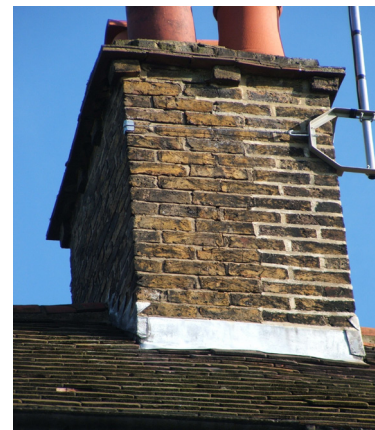
- Pure non-hydraulic lime. This may have been used originally but is now normally only reserved for grade I listed buildings and ancient monuments.
- Hydraulic lime which comes in three strengths, and is easier to use than non-hydraulic lime.
- The third is hydrated lime which is used as an additive to sand and cement mortar.

It is very rare that a contractor will use a pure or non-hydraulic lime mortar. The most likely mix, and one approved by the Trust, will be proportions of 1:1:6 (cement : lime (hydrated) : sand). Great care is needed in making up a mix that will give a similar appearance to original work. Colour should only be achieved by selection of sands and not by using artificial synthetic colouring agents. Sometimes natural earth pigments can be added but these may not be permanent. It is important that the sand is well graded with a good proportion of coarse angular aggregate. The Trust's standard guideline specification for mortar is:

- Any pointing or repointing work must be approved by the Trust.
- The joint must be flush or slightly recessed and of a colour to match mortar elsewhere on the house.
- Do not use a weather struck or bucket handle joint.

Generally the following mortar mix is acceptable: 1 part OPC (Ordinary Portland Cement) : 1 part fresh Hydrated Lime : 6 parts aggregate made up of 3 parts coarse and 3 parts fine sand – all aggregate must be washed (do not use ordinary unwashed soft builders sand). Mortar must not be used too wet and must not be smeared over the arris or face of the bricks. Joints should be slightly brushed back to expose the aggregate. Raking out must be by hand tools and to a depth of between 15mm (absolute minimum) to 25mm and must be to the whole width/height of the joint. The colour of mortar should only be achieved by the colour of sand and not by artificial colouring agents.

For very light coloured mortar, white cement can be used. No proprietary additives should be used. Angle grinders must never be used to rake out mortar. Samples of pointing, in discreet locations must be offered for approval by the Trust before proceeding with the work. Where repointing is extensive a sample of raking out will also be required.



▲ When a jointly owned chimney stack requires repointing it is always best to agree with your neighbour to repoint the whole stack. If the right hand side was in the same condition as the left, it is most likely that the extent of work was not necessary. The result is visually disturbing and the new work too prominent.



▲ The house on the left has recently been repointed. Although the work is of a reasonable standard the colour is not correct resulting in a grid of pointing where the brick is almost lost. Compare with the house on the right where the pointing is subservient to the bricks.



▲ The brickwork in the right foreground has been poorly repointed and would not have been necessary. That on the left side, the main rear wall of the same house, has been left alone. The contrast of the original brickwork to the badly repointed section is alarming and seriously damages the appearance of the house.

n.b. it is important that the Hydrated Lime is used fresh from unopened packs. Do not use lime from packs which have been opened for more than 2/3 days.

It is important that mortar is gauged properly by volume using separate clean containers for each constituent, i.e. buckets or paint kettles. Gauging should not be carried out using shovelfuls as the quantities will not be precise enough.

After raking out and immediately before repointing the brickwork should be washed out. This is to remove loose grit and dust from the joint, and, more importantly, to saturate the bricks. If a dry wall is repointed the bricks will immediately absorb the moisture in the mortar which will dry too quickly, shrink, tend to crumble and loose adhesion.

Mortar prepared for pointing should never be too wet, as it will have a tendency to shrink and crack on drying out, or curing. Water is a 'necessary evil' in mixing mortar and the least amount should be used to achieve workability.

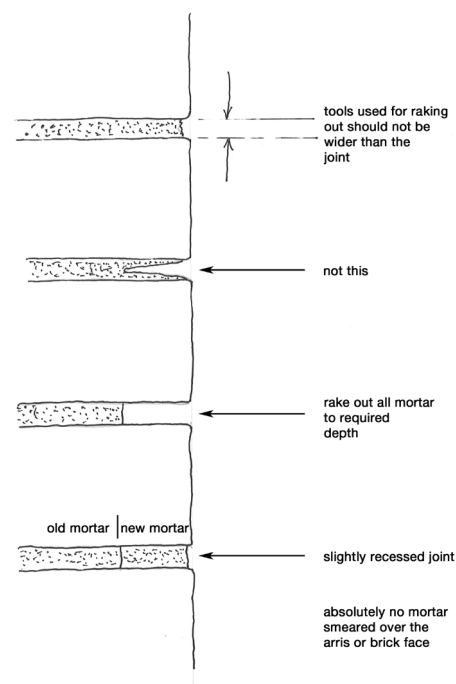
The chemistry of lime and mortars is complicated and cannot be dealt with in this guidance in any detail. The reason for asking for hydrated lime to be used fresh is that it undergoes a chemical reaction on exposure to the atmosphere which considerably weakens or negates its effect in the mortar.

The Trust would welcome the use of hydraulic lime mortar for bricklaying, pointing and repointing, however most contractors have no experience of using it. The proportions of lime and sand are different from those quoted above and the Trust can supply these and more details on request. Cement should never be added to hydraulic lime mortars.

- 2.05 The action of pushing mortar into a raked-out joint is fundamentally different from cutting-off a protruding mortar joint, and great skill is necessary to simulate existing work.
- 2.06 It is vitally important that the joint is raked out properly to its full height and full depth. The depth for raking out for repointing should be between 15mm, absolute minimum, to 25mm. See the attached sketch for clarification.
- 2.07 The colour of mortar makes a surprising difference to the apparent colour of the brickwork wall. It is therefore very important to get a good colour match. Look around and you will see semi-detached houses where one half has been re-pointed, with varying degrees of success or failure. See also section 2.03 above. Some houses have been repointed entirely, either in a single operation or several at different times. All of these may be of a poor quality and reference to adjoining houses may be necessary for a colour match. Please seek Trust advice.
- 2.08 A note on angle grinders: This guidance states that angle grinders must never be used for cutting out. As a general rule this should be adhered to. However in the hands of repointing experts, craftspeople who have been properly trained and understand the mechanics of pointing and different mortars, they may be acceptable. The Trust will always need to assess such operatives and specialist companies before approval for such work with these tools can be given.

3.0 Procedure

- 3.01 Re-pointing can change the external appearance of the property considerably and unexpectedly. It is also not reversible. A plastic upvc window inserted into a house, for instance, can easily be replaced with a wooden or metal one to match the original work. Poor and inappropriate pointing, even if recent, can rarely be removed without irreparable damage to the bricks. The Trust therefore considers that Trust Consent is required for any repointing work.
- 3.02 If you are contemplating re-pointing a property or part of a property, or if this course of action has been recommended or even required as a condition of a mortgage, or if you have been advised to do so by a builder, building surveyor or architect, you are



▲ Guidance for raking out - see text.



▲ The brickwork to this house had been very poorly repointed. The illustration shows that with painstaking and highly skilled craftsmanship this can be put right. This is repointing of the very highest standard. It is necessarily expensive but greatly enhances the appearance of the house and will have a positive effect on its value.

asked to contact the Trust urgently for advice, which is free.

- 3.03 A visit will be arranged to talk the matter over and advice will be given as to the amount of re-pointing, if any, which may be considered to be necessary. Avoid taking advice from builders unless you trust them implicitly through long experience. Bricklayers are not necessarily the best people to advise, or indeed, carry out the work. You will require a specialist. Good repointing is necessarily expensive. Do not go for cheap options; they may ruin your house and devalue it. If cost is a factor it is best to leave the pointing for another year or two until you have sufficient funds. Repointing is very often undertaken unnecessarily, if in doubt leave it alone. What looks like weak mortar will often be adequate, both structurally and visually and have several years life left.
- 3.04 If total or partial re-pointing is considered to be necessary the Trust will again visit to see samples of mortar for colour, texture and pointing style. This discussion should really take place with the Contractor, or indeed the “man with the trowel in his hand”.
- 3.05 Where an extension is being built, or brickwork alterations are being made there is again a need to make a good match to original work for both the pointing and the bricks.
- 3.06 Obviously wet mortar is a completely different colour from dry mortar, and it is quite useless to be called out to see some wet mortar and approve it for colour. Mortar prepared for pointing should never be too wet, as it will have a tendency to shrink and crack on drying out, or curing. Water is a ‘necessary evil’ in mixing mortar and the least amount should be used to achieve workability. Mortar used too wet will also present a smooth finish without the required texture.
- 3.07 Architects or contractors will often have a square metre or so of brickwork pointed up or a new brick panel made. This is invariably required as a condition of the provisional consent for the work. Both of these will take a long time to dry out enough for the mortar colour to be assessed, perhaps weeks in the case of a new panel. If the colour turns out to be wrong, and perhaps the second sample is also unsuccessful, a serious problem of delay arises.

4.0 Samples

- 4.01 The Trust will require to see samples to assess pointing style, and also to assess mortar mix, as well as the bricks themselves. For repointing we also wish to see samples of raking out before any mortar is inserted.
- 4.02 The pointing style for new work can be examined by making a sample panel in the usual way. For repointing a small area in a discreet location should be chosen. Look at the original work in the building and please note item 2.07 above. This is what must be matched. As previously stated the profile is often a flush or very slightly recessed joint. This may be achieved by cutting off in the case of new work or by filling the joint with mortar (in the case of re-pointing) by traditional trowel work. Whatever the technique it is necessary that the joint shall have been well prepared and is well filled and that no mortar is smeared over the arris or edge of the bricks, nor over the brick face.

5.0 General Notes

- 5.01 Repointing brickwork with inappropriate materials, usually hard cement mortar will in time, and sometimes quite rapidly, cause damage to the bricks. It is important to be aware of four very important basic requirements for any brick wall.
- Brickwork should be allowed to ‘breathe’, that is, it should be able to take up moisture in wet weather and then allow that moisture to evaporate readily out of both the brick and mortar. If moisture is trapped in brickwork because of impermeable hard cement mortar then there will inevitably be problems.
 - In a brick wall the brick must always be considered permanent and the mortar sacrificial. There should therefore be cycles of repointing at about 50 year intervals where the brick remains the permanent feature and the mortar is the element that is replaced. Using inappropriate hard cement mortar will reverse this process.
 - The brick in a wall should always be mechanically stronger and denser than the mortar which, should be slightly weaker.
 - Visually the mortar should always be subservient to the brick, it should be to the eye a wall of bricks rather than a wall with an overwhelming grid of mortar.
- 5.02 Never use, or allow to be used, an angle grinder for raking out mortar. In the wrong hands they can cause irreparable and extensive damage.

These Design Guidance Leaflets are published by the Hampstead Garden Suburb Trust and are intended to give general background information and advice to residents, contractors, architects, and others commissioned to design new work, alterations or extensions in the Suburb. They are not intended to be a substitute for employing proper professional advice, and they assume that the reader will have the necessary technical background and practical experience.

There is a wide variety of types of building in the Suburb and it is impossible to lay down a series of rules which will be applicable in all cases. Therefore the advice and hints which are given in this paper must be applied in a sensitive and thoughtful way. It will be possible to find an exception to almost every rule and statement. All those with a specific interest should look around at the existing building or at others by the same architect. They should remember that alterations may have taken place since the building was built, and should not be misled into copying something which is not original.

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