

Historic Buildings

A basic guide to their construction and repair



Historic buildings form an important part of our environment. To ensure their long term survival we should understand how they were constructed and use similar methods to carry out their repair.

This leaflet identifies some of the common forms of construction and materials used in historic buildings. It aims to give a basic insight into reasons for deterioration and how repairs and maintenance are carried out using the correct materials.

When undertaking work to your historic building you need to be aware that some modern building techniques and materials can cause long term harm to traditionally constructed buildings.

For more information or advice on historic buildings New Forest District Council have a Conservation team who can be contacted at Appletree Court, Lyndhurst during office hours

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Front cover:

Main picture - rethatching in long straw

- Rotten window frame
- Thatcher at work
- Casement window
- Cob specialist repairing wall
- Late C18th door

Brickwork

- Made of clay and fired at high temperatures. Old bricks are commonly irregular in size and shape and it is this, combined with lime mortar, which creates much of the character of old buildings.
- Lime mortar is used to bed the bricks. This is usually made by mixing 1 part lime putty to 3 parts gritty sand.

Problems

- **Defects are frequently caused by poor repairs and inappropriate materials; most commonly the use of cement based mortar in repointing. Cement is too dense and sets too hard, which allows no movement and traps moisture within the wall. Frost damage will then cause the face of the brick to delaminate.**



C19th brickwork in lime mortar



Damaging effects of cement mortar

Repair

- **Badly delaminated bricks should be carefully chiselled out and replaced using matching bricks.**
- **Defective mortar joints should be cleaned to a depth of approximately 25mm and repointed using traditional lime putty mortar, matching the characteristics of sound existing joints.**
- **It is not necessary to repoint sound mortar joints or entire elevations just for consistency of finish, as new mortar will quickly blend in with existing.**
- **Angle grinders should not be used to clean out mortar joints or remove bricks as these are likely to damage surrounding bricks.**

Timber Frame

- Commonly the timber frame is made of hardwood and is built to take the structural loading of the floors and roof, with panels of brick or wattle and daub added to keep the weather out.
- Wattle and daub panels are an early form of partitioning, constructed using small diameter wooden spars or withies fixed to the structural members and covered with an earth: lime mixture.

Problems

- **Defects are caused through neglect or inappropriate repair, such as the use of a cement based mortar to fill the joint between brickwork panels and framework. This traps moisture within the fabric of the wall and causes wood decay and frost damage.**

Repair

- **Infill panels must be capable of moving in harmony with the timber frame without cracking. This is achieved by using a lime putty mortar to construct them and to fill the joint between them and the timber frame. The material has the ability to move with the remainder of the structure in order to prevent cracking.**
- **Timber frame repairs should be carried out using seasoned hardwood. All new joints should copy those existing.**



Timber framed cottage



Clay Cob cottage showing layers

Clay & Chalk Walls (Cob)

- Made using clay or chalk subsoil with an aggregate to bulk out the materials, such as sand, and straw to act as a binder, mixed with water and compacted in layers of up to 500mm (20in) in height.
- The walls were usually built on top of a plinth course of brick or stone, but in some cases they were built directly off the ground.

Problems

- **Moisture may become trapped behind inappropriate cement rendering. This will cause weakness of the structure and associated dampness within the building.**
- **It is important that rain is thrown clear of the wall by the roof. Thatch or large barge boards and gutters ensure this. It must also be ensured that the exterior ground level is kept below the plinth so that the cob at the base of the wall does not become damp and weak.**

Repair

- **Common defects with a cob building such as cracking and erosion can be repaired using pre-cast cob blocks and a clay or lime putty mortar.**
- **Repairs using compatible materials should be allowed to air before applying a finish of lime based render or limewash. These finishes breathe to allow the natural flow of air and moisture.**
- **Traditional methods of repair should be carried out by specialist contractors who have a working knowledge of clay and chalk buildings.**

Render

- Traditionally made from lime putty and gritty sand.
- Applied over brickwork and cob walls.
- Lime putty enables an amount of flexibility within the render after it has set. This allows for settlement and variations in temperature.



Render on a late C18th house

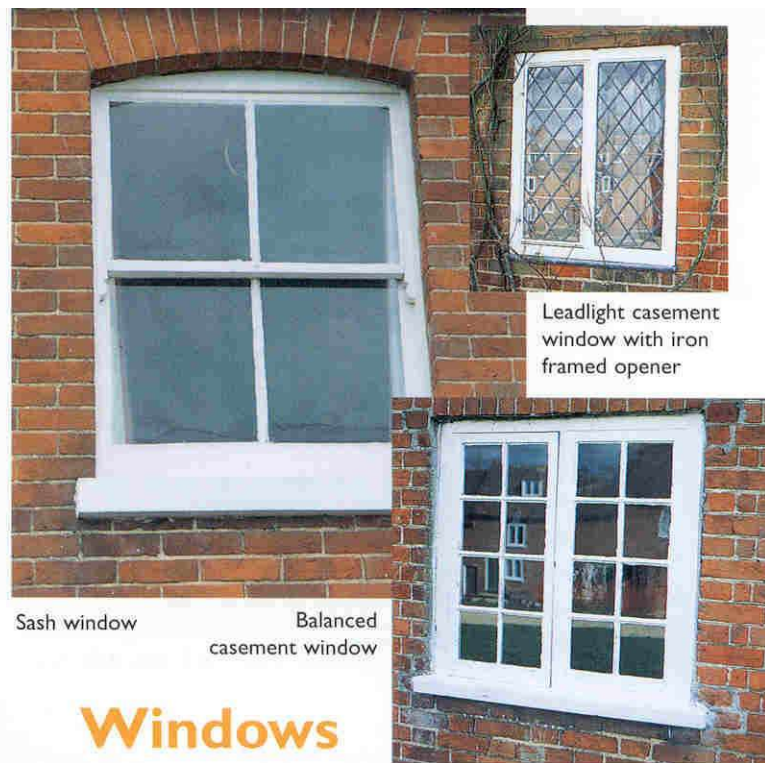
Problems

- Failure often occurs when repairs have taken place using inappropriate materials such as cement. This sets too hard, allows no movement and consequently cracks. Moisture that does enter the wall can become trapped. It freezes, causing the brick or cob to move, thus cracking the render and forcing it off the wall.

Repair

- Areas of failed render need to be removed and re-rendered using a traditional lime based material.

Failed cement render



Sash window

Balanced casement window

Leadlight casement window with iron framed opener

Windows

- Casement windows are commonly made of softwood. The windows are fitted flush with the exterior face of the frame. They are hinged at the sides and open outwards from the centre.
- Vertically sliding sash windows use counter balance weights to enable the sashes to stay in the desired position.
- Original hand made window glass has an irregular, uneven appearance.

Problems

- Defects mainly arise from water penetration caused by defective paint or putty. Gloss paint, which is in effect a plastic coating, does not breathe, and so once water has broken through it, it becomes trapped and subsequent decay of the timber is likely.
- Failed putty at the glazing bars and at the junction with masonry also causes deterioration of the timber.

Repair

- With regular maintenance and repair a traditional wooden window will last many years. This is usually the most economical maintenance option.
- If the complete replacement of a window is necessary then it should be replaced in timber.
- It is important to replicate the original dimensions of the glazing bars, frame thickness and the details of any mouldings and fittings. These tell a lot about the history of the building.

Doors

- Traditionally made from hardwood, but now more commonly from softwood, external doors give character to the elevations of a house. The originals should be kept whenever possible.

Problems

- Doors and door frames rarely suffer from decay severely enough to render them completely irreparable.
- Water penetration, which causes swelling, distortion and defective hinges, can make a door difficult to use. This can lead to poor fitting and in turn allow draughts and rainwater into the building.

Repair

- Regular painting will minimise moisture entering or exiting the door and frame, and the timber should remain sound. Breathable 'microporous' paints should be used to prolong the life of the timber.
- Partial repair is usually more prudent than total replacement.
- Doors should be repaired using similar material and jointing.
- If the total replacement of the door is necessary then it should be made to match the original in style and moulding. Where possible the existing fittings should be reused.

Plank door



Slates

- Fixed with nails to counter battens.
- A valley is formed when two roof slopes intersect. They are made watertight by placing lead sheet into the valley to allow water to drain.

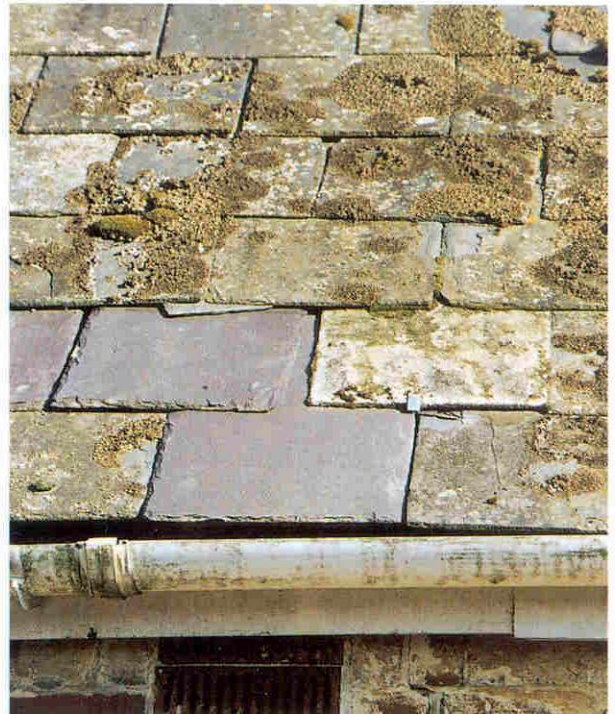
Problems

- Common problems may include slates which powder, or fixing nails which corrode, thus allowing slates to slip.
- Lead flashings and mortar flaunchings around chimneys and adjoining walls can fail through excessive weathering or age.
- Slipped slates and failed flashings will allow water into the roof structure and eventually cause decay.

Repair

- Rectify by replacing with matching natural slates using non ferrous nails.
- Replace any failed flashings. Ensure the correct code of lead.
- Replace any failed flaunching, consistent with the form of the original.

Replacing old slates





Plain clay peg tiles with 'bonnet' hips and swept valleys

Tiles

- Made of clay with holes near the top edge to allow pegs to be inserted which fix over the tile batten, or nails which attach to the batten. Later tiles have nibs on the upper edge to hook over the batten.
- Specially shaped tiles are made to form roof valleys and hips.

Problems

- **Common defects relate to tiles which may delaminate and batten nails which corrode causing the battens to slip.**
- **Fixing pegs can decay through age and cause the tiles to slip.**
- **As with slate roofs, failed flashings can allow water to enter the building and eventually lead to dampness and rot.**

Repair

- Rectify by replacing defective tiles with matching and refasten battens using non ferrous nails.
- Ensure all flashings are sound - replace if defective.

Ridge tiles

- Made from clay and bedded on lime mortar.
- Ridge tiles are produced in various forms; the most common being half round and angled. 'Crested' is the term given to a pattern standing vertically from the tile.
- Traditionally, red ridge tiles are used with clay roof tiles and blue glazed ridges with slate, unless local fashion dictates otherwise.



Crested clay ridge tile

Problems

- **Ridge tiles delaminate and, if necessary, should be replaced with tiles to match the original whenever possible.**

Repair

- Ensure mortar joints are kept well pointed as the ridge takes the most severe weather.

Rainwater Goods

- Traditionally gutters and downpipes are made of cast iron. Half round guttering is supported with iron brackets built into the wall or secured to fascia boards and rafter ends. 'Ogee' shaped gutters, which have a flat back, are usually screwed directly to the fascia board.



Poor detailing & broken cast iron downpipe

Problems

- **Neglecting rainwater goods can cause many problems in buildings, including damp, erosion of mortar joints and wet and dry rot.**

Repair

- If gutters are to be painted it is wise to paint the insides with a bituminous paint.
- Regular maintenance includes keeping joints water tight, ensuring the water flows towards the downpipes and keeping gutters clear of vegetation. This simple expedient action can ensure major problems are avoided.

Chimneys

- Commonly built of bricks with a lime based mortar and sometimes finished with render to match the elevations of the building.
- Important features, not only to an individual building, but to a scene or area where they help to shape the character.

Problems

- **As exposed features they are subject to severe weather. Water penetration and frost action can lead to rapid decay.**

Repair

- **Regular maintenance should be carried out to the brickwork / rendering. Mortar flaunching, at the base of the chimney stack, must be checked to ensure it is not cracking, thus allowing water into the stack. Alternatively lead flashings should be sound.**
- **All pointing should be firm and each bed full of mortar.**
- **The use of a lime putty mortar for pointing and flaunching is essential.**

Use of buff & red brick



More elaborate styles



Traditional long straw thatch with flush ridge

Thatch

- Fixed to counter battens using steel nails or hazel pegs.
- There are various thatching materials, each having a different appearance; water reed, combed wheat reed and long straw.

Problems

- **Old age and lack of maintenance cause water ingress into the building. In time this will cause decay within the roof structure.**

Repair

- **It is not always necessary to renew all of a thatch. A top coat is usually sufficient with a full depth replacement at the eaves and on the ridge.**
- **The thatch should be kept clean and free from moss and lichen to enable the surface to dry out.**
- **With all types of thatching materials the ridge will need maintenance every 10-15 years.**



Thatch receiving top coat

Old and new building materials act in different ways

- Old buildings can be seen as wearing 'waxed jackets' - They breathe, whilst allowing moisture into and out of the fabric. As long as they are regularly maintained, these structures remain stable for many years.
- Newer materials, which are sometimes used in inappropriate repair can be seen as 'plastic macs'. They do not allow moisture in, but conversely, they sweat. This can cause condensation and damp. If, through a defect, water does get in, it can not dry out.
- Buildings should be allowed to breathe - therefore they need to be repaired and maintained properly.

Damp

When excess moisture builds up in the structure and cannot escape as intended, it finds the line of least resistance, and we call it 'damp'. This may happen when:

- external ground level is too high, allowing rising moisture to bypass or bridge damp proofing or plinth courses.
- hard mortar is used to point the joints of masonry. This forces the moisture into the softer, more yielding brick or stone, causing it to delaminate, or to lose its fired surface.
- a hard render prevents any moisture leaving the building. In time the render will be forced off in plates, but not before the moisture has condensed onto the internal walls or become trapped in the walls of the building.
- lack of maintenance of the gutters allows overflowing water to soak the walls, thus causing damp and rot.

Condensation

Condensation occurs when the natural ventilation through a building is blocked. Chimneys, roof ridges, eaves, doors, windows and underfloor voids may all be places where air is filtered into a building. Effective insulation can still be achieved while allowing such ventilation, but these fresh air routes must not be blocked.

Movement

Traditional materials expand and shrink at imperceptibly small rates as their moisture content varies. This movement is natural, and is quite necessary for the integrity of the structure. The movement will often be seasonal.

Buildings must be stable, but this is not the same as 'strong' or 'rigid'. It is wrong to attempt to stop an old building moving cyclically by using hard materials which do not move. Stresses and strains are created and this can lead to a material cracking.

Lime versus Cement

Lime-based mortars and renders allow movement in building fabric and enable the movement of moisture. Cementitious mortars and renders do none of these things and sooner or later lead to building failures. Use lime and employ builders who use it.

Before you do the wrong thing, stop and think about how your building works.

Maintenance reminders.

- Prevent heavy vegetation from growing into the walls and roof.
- Ensure that the external ground level is lower than the internal ground level.
- Keep gutters and downpipes clear.
- Ensure exterior woodwork is painted.
- Ensure the building is adequately ventilated.
- Do not repair or repoint with cement mortar.

Let us know if you have any comments on this leaflet.



C19th Forest Cottage