NEW FOREST NATIONAL PARK

New Forest DISTRICT COUNCIL

The raw ingredients for cob making

Historic buildings

Chalk and clay cob

This leaflet describes the character of mass cob, identifies some of the problems associated with it, and methods of repair.

There is a list of references and useful contacts on the last page.

Introduction

In the New Forest there are zones of clay and chalk based cob. There is chalk cob to the north-west, around Martin, Damerham and Rockbourne, while across the rest of the area to the south and east of Fordingbridge there is clay cob, with a proliferation around Beaulieu, Boldre and Lymington.

Cob cottage typical of the Forest

Cob construction

Cob is a lump material made of clay, marl and chalk mixed with gravel and straw as a bonding agent.

Sometimes cob is built off a plinth or underpin course of stone or brick. In some areas a lime slurry is daubed over the walls for protection from the weather. In the New Forest it is not uncommon to find the external face of the cob left exposed and for there to be no underpin course visible above ground level.

In clay cob, the aggregate provides the bulk and density, and consists of silts, sands, gravels and pebbles. The clay binder, bonded onto each particle, holds the mass together. The volume of clay in a wall is generally no more than 20%. Chalk cob walls can be pure calcium carbonate.

In clay cob, fibres are added to provide additional stability to the mass and allow it to be turned over and dried evenly on the ground. The use of straw, oats, barley and animal hair is common. Chalk cob does not necessarily require these additives provided that there is a full range of particle sizes within the mix to bond cohesively.

Other stabilizers were sometimes included to add further to the strength of the wall. Cow dung was a popular additive, as was lime. These materials also increase resistance to water (which helps to prevent shrinkage), and protect the external face of the wall. Cob walls are built in courses called 'lifts', which usually do not exceed 600mm. On buildings with no render, these lifts can be clearly seen. The thickness of the wall diminishes with height, and might not exceed 300mm at wallplate level.

Cob blocks

Gradual effects of the weather can cause surface erosion, and cracks occur as a result of movement

Small building with typical problems affecting cob - the walls are cracked as a result of movement and constant dripping of water which has worn away the face of the render and the base of the wall. The building has been reinforced with a buttress and new render has been applied to part of the wall

History

Cob has been used for thousands of years. In Britain there is evidence of its use dating back to the C13th. It was used as a cheap and readily available building material, which required the minimum of tools, skills and knowledge to use. Mass cob was the traditional method of earth wall construction. It developed in areas with poor building stone or limited timber supply. Its use was predominant in the south-western counties and parts of Hampshire. During the C19th there was a surge in cob building as taxes prohibited the lower classes from building in brick. However, towards the middle of the century when the taxes were repealed, cob construction tailed off, and by the turn of the century very little new cob building was taking place.

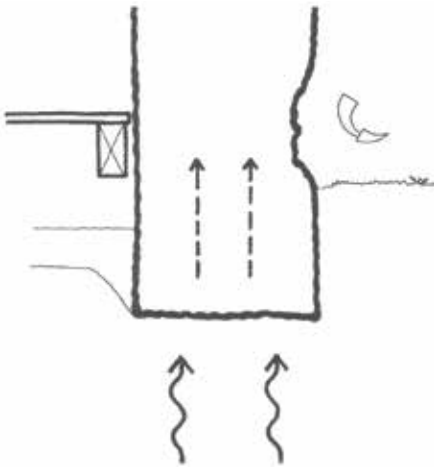
Problems and repair

Structural integrity

This is very important to the longevity of cob buildings. Cob walls are mass structures which have three-dimensional stability. If one wall of the enclosure is broken, removed or has failed, then the structural integrity of the whole is compromised and instability may occur.

Surface erosion

The gradual effect of the weather can cause surface erosion. Historically, cattle would rub against the corners of the cob wall. Damage may also be caused by foliage, or the boring of masonry bees. Bushes densely situated by a cob wall will prevent drying out of the surface of the wall, thus allowing mosses and algae to develop. Masonry bees bore into the cob, which slowly weakens the mass of the wall.



Moisture drawn into the wall. In freezing conditions it may expand and spall.

Moisture

Moisture is the major problem for cob buildings. In the New Forest many of the cob buildings are constructed without a plinth course. Consequently, moisture is drawn up from the ground into the semi-dry core of the wall and when frosts occur, spalling can affect the outer surfaces of the structure.

If repetition of the problem is to be avoided it is not sufficient simply to address the actual damage caused to cob and carry out the necessary repairs. It is very important to identify the cause of structural movement and to rectify this before undertaking repair.

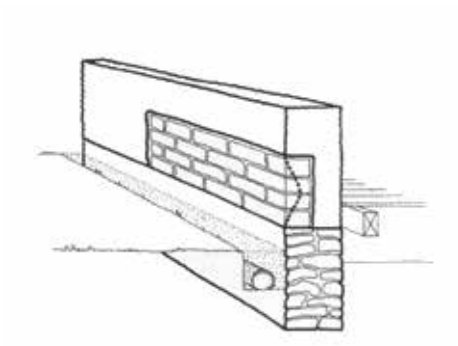
Repair should always be carried out on a like-for-like basis using the same materials as exist. However, the use of pre-made cob blocks (as opposed to mass cob) made of similar material is a practical solution. It is usually the case that clay or chalk was dug from the ground close to the building and the ideal source for repair material may therefore simply be in the back garden. The blocks can be formed in a mould and then left to dry out naturally. Pre-formed cob blocks do not shrink and are easier to position than a slurry of cob. This approach consequently maintains the strength of the wall. Brick or concrete block should not be used, as their various densities create differing rates of absorption and

Cob repairs in progress

Moisture trapped behind cement render

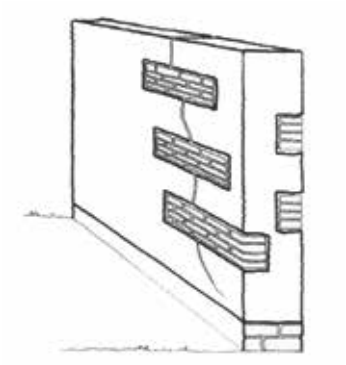
drying. This causes an imbalance in the moisture content and shrinkage or cracking caused by differential movement results.

Cob blocks can be used to repair cob damaged by erosion or to reinstate missing areas of cob. When sections or even whole elevations of cob need rebuilding, straight vertical or sloped joints should be used, as stepped joints induce cracking when shrinkage occurs.



Cob blocks used to repair an eroded wall - the area of erosion is squared off and blocks inserted.

Cracks may also be 'stitched' using cob tiles, placed within recesses cut into the depth of the wall. Cob blocks and tiles should be laid to course and bonded with a slurry of the same material, with a little lime if required.



Cob tiles stitching a crack - recesses cut across crack at 1m. Centres internally and externally, and tiles inserted.

Cob repairs

Surface treatments

Treatments such as the use of cement render, can cause severe problems. The rigid render inevitably cracks, allowing moisture to become trapped behind, eroding the cob and in winter freezing and bursting the render off the wall. Furthermore, a constant accumulation of water can lead to an instant and dramatic slump, where entire sections of wall can fail.

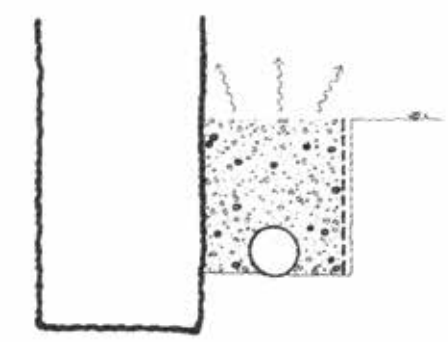
Cement render should not be applied. However, where it exists the benefit of its removal should be carefully considered, as it may well introduce further problems, in particular causing damage if it still adheres well to the cob. If a wall is bare of render, it may be prudent to apply a lime putty based slurry or a 'sacrificial coat' of limewash - so named because its intention is to bear the brunt of the elements, and in so doing protect the mass of the wall. This limewash requires re-application every few years.

Cob wall which is in poor state of repair. The capping is inadequate allowing water to enter, surface render has failed and the foundations are weak

This cob wall should remain sound for a long time as it has a 'good hat and a pair of boots'

Understanding the material

It is important to understand the composition of clay or chalk cob before embarking on repairs. Simple sedimentary tests can indicate the basic proportion of constituents. A small volume of cob, deposited into water in a glass test tube or similar, is left to settle for a period of days. The resultant separation of the layers indicates the basic composition. However, further professional analysis may be required to confirm detailed make up.



A land drain effectively dissipates surface water, and pea shingle reduces splashing

Detailing

Detailing can be a problem for cob. If a roof is defective or has changed in later years, for example from thatch to tile with a reduced eaves overhang, constant dripping of water can eventually wear away the face or base of the wall.

An old Devon maxim states that if a cob wall has 'a good hat and good pair of boots' it will remain sound for a very long time. A cob wall requires a roof overhang of between 400mm and 700mm in order to throw off rainwater sufficiently from the wall and to prevent splashing and subsequent erosion of the wall. The plinth can be considered the 'boots'. It is more dense than cob and reduces the volume of moisture that is drawn up the wall into the cob.

If the necessary roof overhang no longer exists or there is no plinth above ground then creating efficient drainage around the base of the walls can help to prevent damage. A shallow channel is dug around the building and land drains laid in it. The use of variously sized pea shingle and loose weave fabric, dressed vertically between the shingle and the face of the soil, reduces the amount of water collecting at the base of the wall and helps to prevent splashing.

Rats

Rats occasionally create runs through the length of a wall significant enough in length and volume to seriously weaken the integrity.

Long runs in cob created by rats can be effectively filled using a grout. The entrance hole should be filled with a lime putty-stabilised mix of cob to prevent the grout from trickling out. The mix of lime putty and sand can then be poured into the tunnels from a drilled access hole above, until all runs are filled. Alternatively, cutting small holes along the line of a horizontal run and packing with cob mixed with a 10% lime putty additive can effectively repair the damage. In all cases of suspected rat damage, a cob expert should be consulted to establish the extent of the runs and the most suitable method of repair.

Historic buildings
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Further information

Click on the website address for link

References

Conservation of Clay and Chalk Buildings
by **Pearson, G.T**
Donhead 1992

The Cob Buildings of Devon 2 Repair and Maintenance

Society for the Protection of Ancient Buildings
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If you require further information about any of the issues raised in this leaflet or any other building conservation matters, please contact the Building Conservation Officer at

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