# CONSERVATION AND RESTORATION OF BUILDINGS

## preservation of masonry walls

Australian Council of National Trusts


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## preservation of masonry walls

Compiled by Clive Lucas, O.B.E., B. Arch., FRAIA
of the Conservation and Restoration Committee
of the Australian Council of National Trusts.

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## FOREWORD

*This publication is the third in a series which is being produced by the Australian Council of National Trusts to help those who wish to preserve some part of Australia's architectural heritage.*

*The first bulletin in the series was Philosophy and Approach, the second, Preservation of Roofs. Subjects planned for subsequent publications are set out on page 32 of this bulletin.*

*The Council records its thanks to the General editor of the series, Clive Lucas, to members of the Conservation and Restoration Committee and others who assisted in the compilation of this bulletin.*

*Bulletins in this series and specialised technical bulletins in a companion series are available from the National Trust at addresses listed on page 32.*

**V.H. Parkinson** B.E.M.
Chairman
Australian Council of National Trusts

September, 1982.


## ACKNOWLEDGEMENTS

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*Particular appreciation must also go to Gavin Walkley C.B.E. of Adelaide. As with the previous two bulletins it was he who, with the late Stephen Gilbert, corrected my grammar and put the publication in order.*


Church Hill, Sydney.
September, 1982.

**C.L. Lucas**

*Note:* All photographs are by Clive Lucas Pty Ltd unless otherwise acknowledged.

# CONSERVATION AND RESTORATION OF BUILDINGS

## preservation of masonry walls

*By Clive Lucas,* O.B.E., B. Arch., FRAIA.

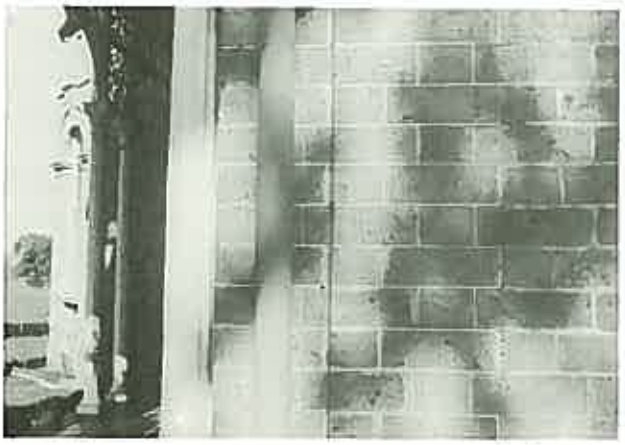
## INTRODUCTION

Genuinely historic and significant buildings require special care; however, the techniques developed for their care are applicable to most old buildings. This bulletin looks at some of these philosophies and techniques for identifying and overcoming problems.

The wall is perhaps the most prominent feature of a building. Its material and construction distinguishes the character of one locality from another. It is also the one which is reflected in government statistics in censuses about buildings.

The status walls give to buildings is very interesting. Thus there has always been the tendency to imitate a better material when the best finish can't be afforded or to use only the better material or time consuming workmanship on the front wall. So try to understand that a building with a fine ashlar or rendered imitation stone facade and rubble or brick sides is the original design treatment, just as in late Victorian buildings the front wall will often be of better bricks and be tuck-pointed while the other walls will be of common bricks with normal jointing. It does not mean the building is unfinished or the workmanship is inferior.

Typical of the 19th century, the dressed stone is reserved for the front wall. *(Foresters Hall, 18-20 Sackville Street, Portland, Victoria.)*



A late nineteenth century example where the tuckpointing is confined to the front and returns only slightly down the side. *(Greenwood, Singleton, N.S.W., built 1889.)*


Hidden by 1950s cement render this 1820s house is unrecognisable. *(Harrisford, 182 George Street, Parramatta.)*

After hacking of the cement render and rebuilding the face of the wall and restoring the stone dressings and tuckpointed the brick arches the house is recognisable again as Georgian. *(Restoration architect: Clive Lucas.)*

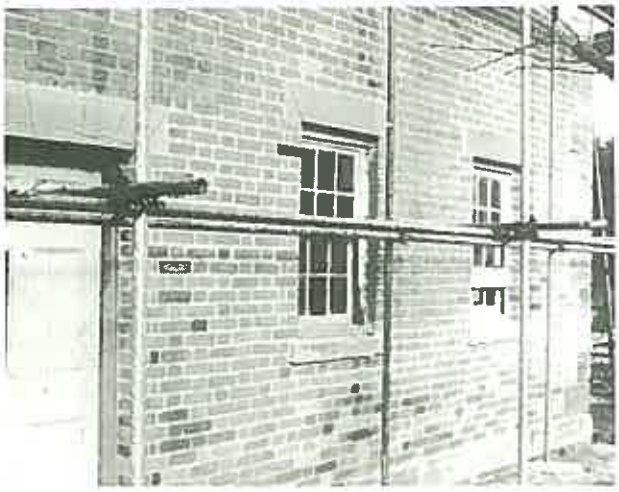
# PHILOSOPHY

Over 100 years ago John Ruskin, the great English nineteenth century writer and art critic, wrote of an old building: "... count its stones as you would jewels of a crown ...", and of its maintenance and care "... do this tenderly, and reverently, and continually, and many a generation will still be born and pass away beneath its shadow."

These words mean just as much today and they should be borne in mind by anyone wanting to do something to an old building. It is very important to keep as much as possible of the old work even though it may be damaged or worn.

It is the original materials of a building which make it important. These are the pavements our ancestors trod and the walls they leant against, the doors they opened, etc. Once materials have had to be refaced or rebuilt to any marked degree the building loses its real value and becomes little more than a reproduction. Also a building must be seen as an organic whole which has reached an equilibrium with its environment. One must be very careful not to disturb this equilibrium or damage the building by the unthinking introduction of modern materials.

Try to understand what is important about your building before beginning work. Respect the technique used to construct the building.



The careful repointing of a brick wall so that the new blends with the old. The lime mortar has been struck to match the original. *(Harper's House, Berrima, N.S.W. Architect: Clive Lucas.)*

The original front doorstep to this house is very worn but if not sufficiently worn to have become dangerous or a problem, it should be kept. *(Bona Vista, Avoca, Tasmania.)*

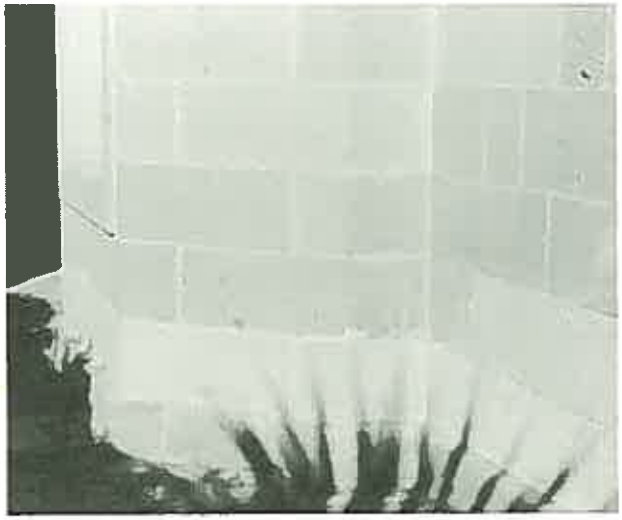
These gently worn steps are original to the house and therefore precious. *(Runnymede, New Town, Hobart.)*

If repairs **are** necessary the material used must be as close to the original as possible, e.g. the jointing must be the same both in appearance and in consistency as the original. Lime mortar must be used in almost all cases, except in very exposed positions where a small amount of cement is advisable. In repairing stone work it must be seen as invisible mending, i.e. the tooling must be in the spirit of the original and if possible the stone used from the same quarry. Try to save as much of the old work as you can for as long as you can. Try to distinguish good honourable wear and tear from mutilation.

In parapets and chimneys a small amount of cement can be used to allow for more severe weathering.
*(Harper's House, Berrima, N.S.W.)*

A rubble garden wall before restoration.
*(Brewery, Burra, South Australia.)*

The technique used for repointing the wall shows no respect for the original material or technique. The result of unthinking repair is a disaster. *(Brewery, Burra, South Australia.)*



The careful choice of stone and copying of the original tooling and jointing allows a wall to be repaired.
*(Government House, Hobart. Restoration architect: Clive Lucas.)*

Mason raking out hard cement pointing prior to refacing certain stones and repointing the wall in lime mortar.
*(Government House, Hobart.)*

# MATERIALS

In this Bulletin masonry is defined as brickwork and stonework. Generally, walls in the nineteenth century were solid, without cavities. Cavity brickwork was introduced in some buildings during the last decade of the 19th century.

The materials normally used in Australia for walls were Brick, Stone and Earth.

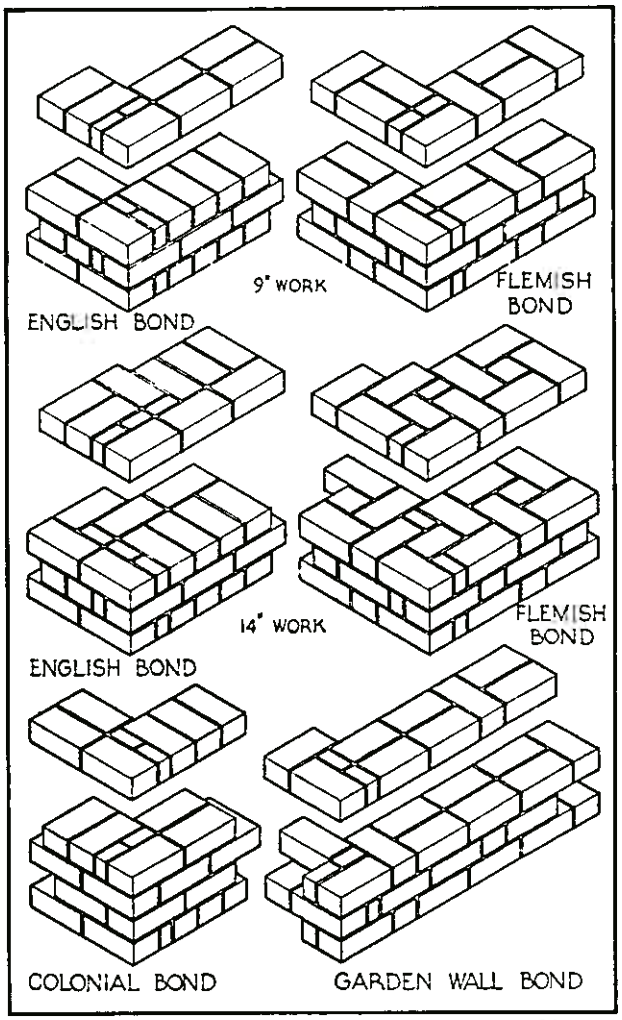
## BRICK

Bricks were usually sandstocks, that is, they were made by hand in moulds which were lined with sand. The older the brick the softer it usually is. Generally sizes differ, although as the century progressed bricks became standard, usually 230x110x75 mm (9x4½x3 inches). During the last quarter of the century machine-made bricks were introduced. They are much harder and more exact in profile.

Bricks are laid in various bonds: Flemish, English and Colonial being the commonest although various combinations and eccentric arrangements will often be found.

Solid 335mm (14") walls are usual for exteriors although during the boom period in suburban developments walls of 230mm (9") and sometimes even 115mm (4½") will be found. These last two types are frequently rendered or painted in an attempt to prevent water entering the building.

The rendering of the external face of brick is usually completely misunderstood. For most of the nineteenth century brick was often considered to be an inferior material. Thus it was often rendered externally, lined out to represent ashlar and painted a stone colour. In many cases the rendering is also a necessity for keeping the building waterproof. Even if brickwork was not rendered it was sometimes painted or colour washed; again usually a stone colour and as much a waterproofing measure as an aesthetic consideration. Much damage has been done in recent years by people who have mistakenly removed render or paint from brickwork in the name of restoration. BEWARE!




This diagram shows the three most common bonds used in 19th century Australia – Flemish, English, and Colonial.

A brick wall rendered in imitation of ashlar. Only the window sill is sandstone. *(Richmond Villa, Campbelltown, N.S.W.)*

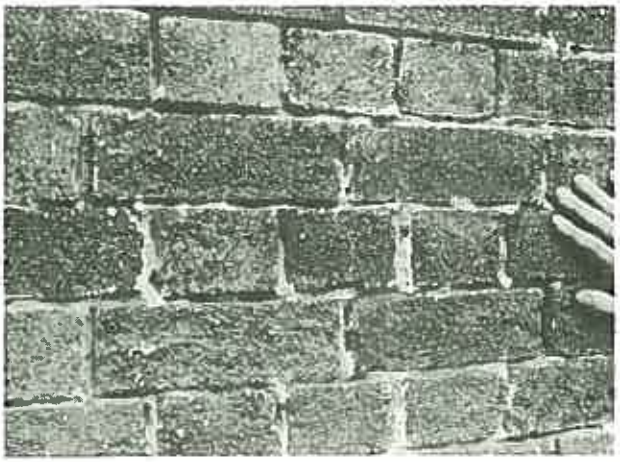
In recent years many 19th century buildings have had their protective render coat removed to expose the sandstock brickwork in the mistaken view that this is how they were originally. *(45 Moncur Street, Woollahra, Sydney. Photo in possession of Mrs. S. Carter.)*

In this Sydney example the rendering has been put back, not only restoring the correct character to the house, but also making it considerably more waterproof. *(Restoration architect: Clive Lucas, Photo: Jyoti Somerville.)*

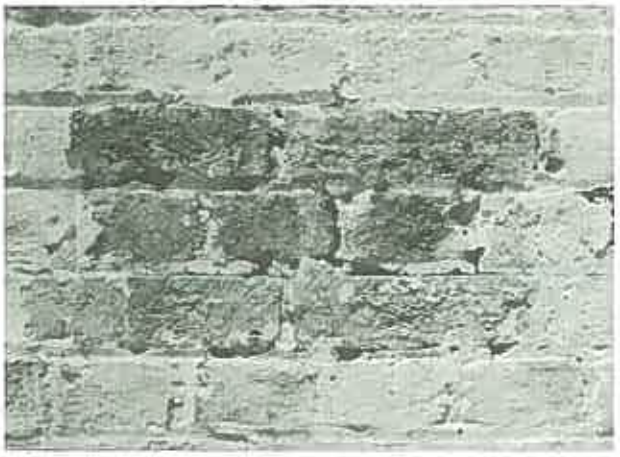
Even with painted brick walls which were not originally painted it is probably better to accept the situation and paint them a sympathetic colour rather than attempt to remove paint, which will normally be destructive to the face of the brick. Perhaps in the future a non-destructive method of paint-removal may be perfected, so it is best not to be destructive now. Only expensive, very labour-intensive techniques work, and so it is only justified where the painted section is a minor part of the whole; as for example, where a built-in section of a verandah has later been opened out. Those techniques which are least harmful to the face of the brick usually involve saturating the wall with chemicals. However, some harm may be done because the process can accelerate the action of damaging salts which are present in the wall. The degree of attack will vary depending on the level of salt contamination, quality of masonry, the environment, etc.

In this example of a face brick building where a small section under the verandah has been painted, paint removal can perhaps be justified. *(37-39 North Street, Windsor, N.S.W. prior to restoration.)*

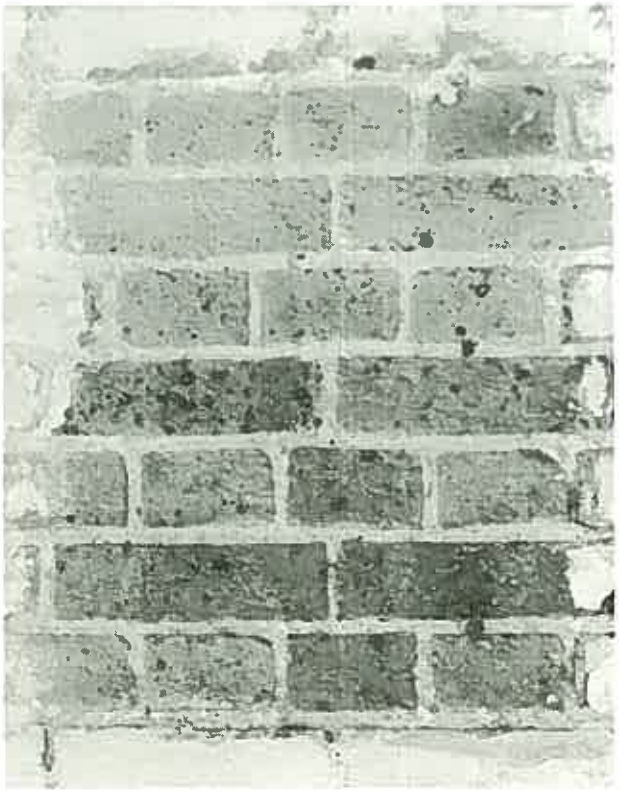
Removing paint off sandstone with a hand operated needle gun. It does not remove all the paint but in a few years what remains could well weather off.



Most cleaning processes which remove paint also remove the surface of the masonry and the mortar and are therefore harmful. This wall will now absorb moisture quite readily.) *(House, Windsor Street, Richmond.)*



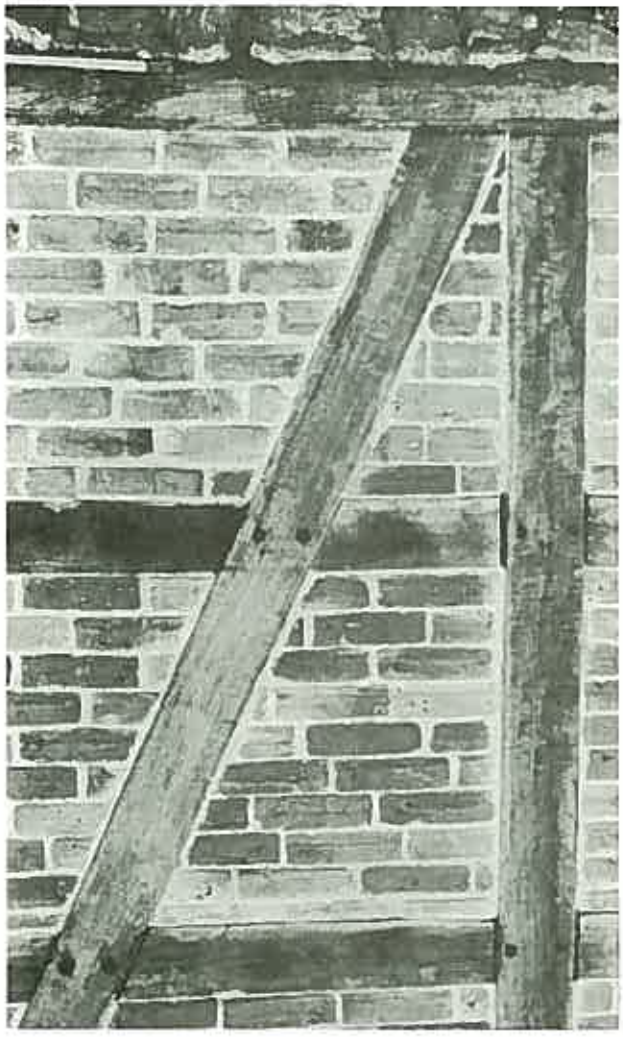
Removing paint off sandstock brickwork by water pressure removes the paint but also the soft jointing and makes the wall very wet. It would have to be repointed.



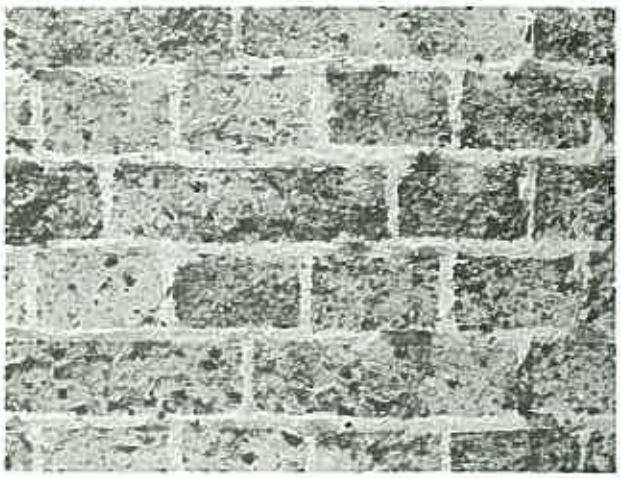
Cleaning paint off sandstock brickwork by a chemical and mechanical method removes the paint satifactorily but the saturation of the wall may cause harmful chemical action with salts in the structure.

One should bear in mind that if an exposed brick wall has been painted it was probably as a waterproofing measure anyway.

Brick nogged walls, that is, brick infill in timber frames will also be found in the earlier period. This was usually weatherboarded or plastered externally and always plastered inside. The South Australian examples around Hahndorf of exposed brick nogged walls are extremely rare and derive from the imported building traditions of northern Germany. Painted and unpainted examples exist.



Exposed brick nogged construction in a house at Paechtown in South Australia. Such construction is rare in Australia. *(Paech Cottage, Peachtown, South Australia.)*



Cleaning paint off by light tooling, even if carefully done as here, does take the face off this wall of soft sandstock bricks, destroys its character and makes the wall more susceptible to water absorption.

This house may well have been facebrick when it was new but it has been painted a long time, probably as much for keeping its solid walls dry as for fashion. It should continue to be painted. *(Rhodes, South Esk River, Tasmania.)*

This early cottage in Sydney has had its external weatherboards removed revealing its brick nogged construction. The boards should be restored. *(Cottage, 45 Glebe Street, Glebe, Sydney.)*

## STONE

Before transportation made it possible to move materials easily over great distances, building materials were nearly always regional and this is particularly true of masonry.

Bricks are usually different between one town and the next, or even between one homestead and the next because the bricks came from clay readily to hand.

This is also true of building stones which nearly always are local in origin. R.T. Baker lists some 300 building and ornamental stones in Australia. (vide Baker, R.T., **Building and Ornamental Stones of Australia,** Sydney 1915.) While bricks are found in numerous arrangements of colour and bond it is true to say stones provide much more variation and there are of course structures which are built of both stone and brick.

A house which combines both brick and stone in its construction to achieve a decorative effect.
*(The Manor, Baschus Marsh, Victoria, c. 1840. Photo: Wesley Stacey.)*

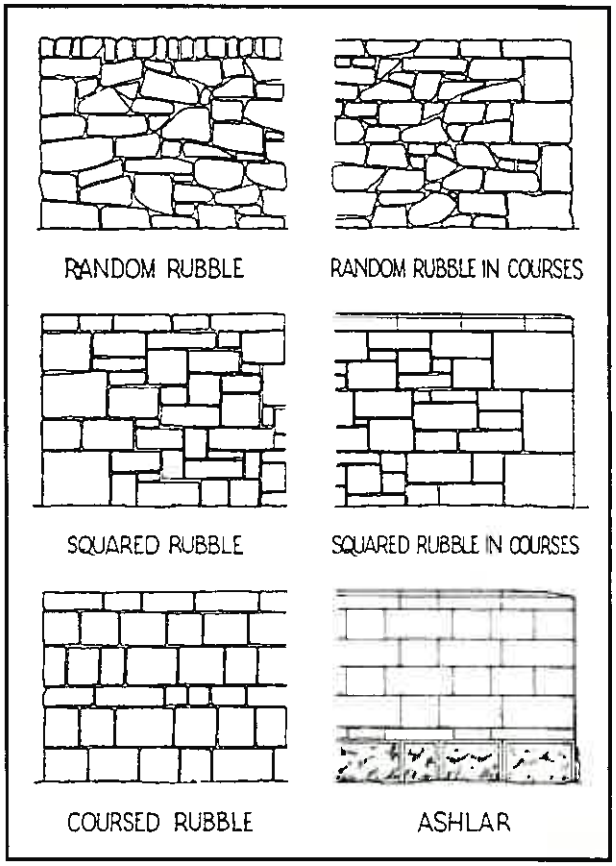
The basic stone wall is of random rubble, in which stones as found in the countryside are stacked up with as little shaping as possible to provide two faces, except at apertures and corners. These areas are sometimes trimmed with brickwork or another more workable building stone.

Two-faced stones were used as ties in some positions, to tie together two skins of rubble, erected simultaneously from inside and outside, the outside skin being built with selected stones which show one good face.

Coursed rubble was probably the next refinement and then ashlar walls of even courses in which the face is tooled in many different ways ranging from a surface that has been ground perfectly smooth, to rough picked and quarry face.

A sophisticated house of random rubble which is coursed and the front facade pointed. The corners and apertures of the house are trimmed in brick.
*(Cottage, Dundas Street, Gawler, South Australia.)*

Walls built of random rubble collected from the countryside in its most basic form. *(Miner's cottage, Arltunga, Northern Territory.)*

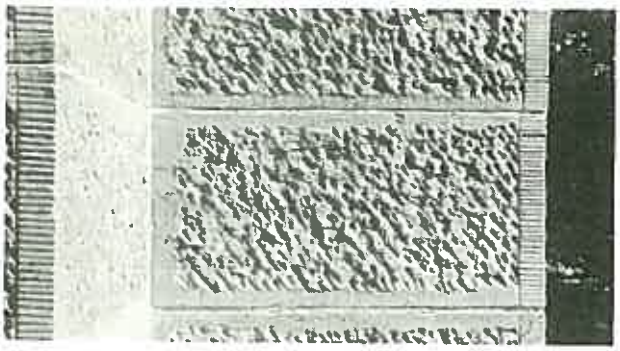



Various types of stone walling.

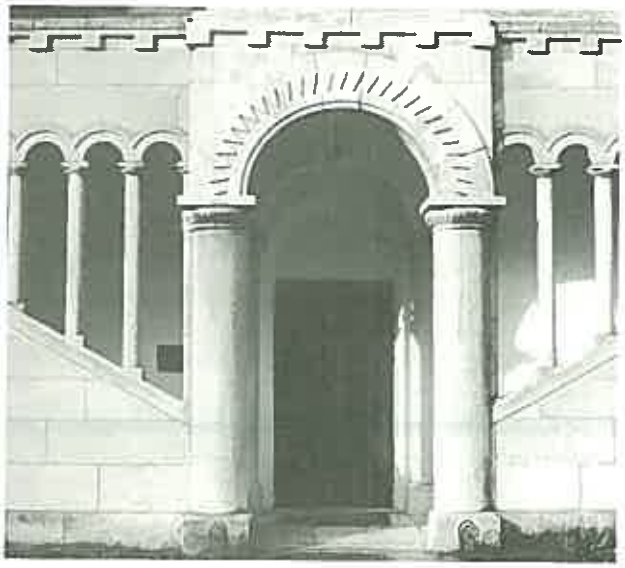
The individuality of stone walling must be appreciated as in this restored retaining wall at Port Arthur.
*(Priest's House, Port Arthur. Restoration architect: Clive Lucas.)*

Fine bluestone rubble walling which has been squared and coursed in this western district example.
*(Shearing shed, Lyne Station, Hamilton, Victoria.)*

A highly individual treatment of rubble used with freestone trimming. *(Parish Hall, Avoca, Tasmania.)*



A fine example of century old stone work with its tooling and pointing intact. *(St. Paul's, Murrurundi, N.S.W., built 1872–74.)*



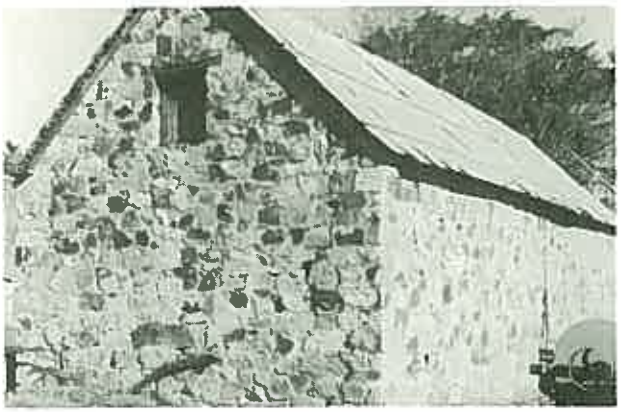
The contrast of stone tooling is part of the character of this fine building. *(St. Mark's, Pontville, Tasmania.)*

In this wall the repair has not captured the spirit of the original construction. *(Balladong, York, Western Australia.)*

Like many brick buildings, rubble stone buildings were often painted to keep them waterproof and also to give the illusion of better quality construction. Many were also plastered or rough casted for the same reason. Many old barns today look unpainted but if you look carefully you will usually find traces of lime wash or paints in crevices or under sills and eaves where there is protection from the weather. Internal whitewashing or painting was often done for disinfection and for easier cleaning.

Dressed stone, particularly sandstone, is normally used for string courses, lintels, quoins, window sills and other dressings in face brick buildings. Even in masonry buildings, such as rubble or brick, which are plastered to simulate dressed stone, window sills are usually of stone, although in regions where sandstone is not available hardwood is sometimes found painted to look like stone.

In the second half of the nineteenth century, with improvements in cements, there was a tendency for all applied detail including sills and cornices to be mocked up in render over a rough stone or brick core, as a substitute for dressed stone. Cantilevered stones were sometimes used as a core material for the support of heavy cornices, the parapet walling acting as a counterweight.



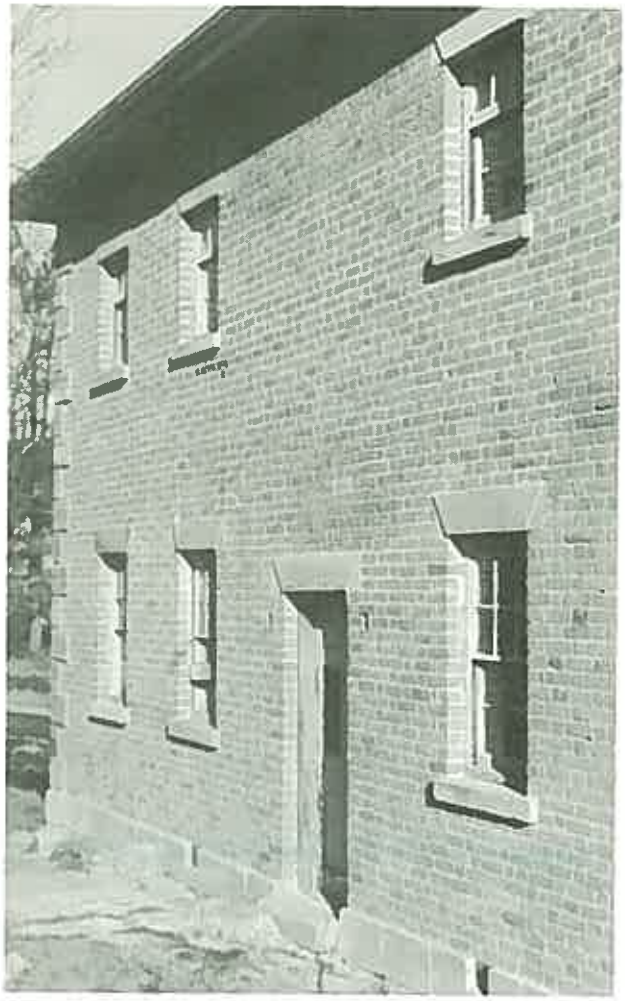
A good example of typical random rubble construction. The walls have once been limewashed so it should be understood the original quality was somewhat different. *(Barn, Carcoar, N.S.W.)*

The walls of this building are brick plastered and lined out to simulate ashlar. Only the window sill is sandstone.
*(Cooma Cottage, Yass, N.S.W. Restoration architect: Clive Lucas.)*

A plethora of sandstone finishes is an important character of 19th century architecture.
*(Pitt Street, Sydney in 1870, the site of Australia Square. Photo: N.S.W. Government Printer.)*

Sparrow picked ashlar with rubbed dressings produces a delightful effect. *(Wentworth House, Bothwell, Tasmania.)*

In this late Victorian house the cement rendered cornice has a core of sandstone. *(Iona, Darlinghurst, Sydney, 1890.)*



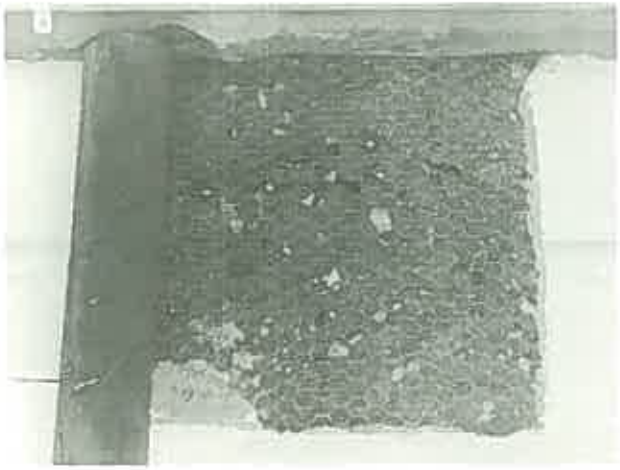
While the walls are brick the base string, the window sills and heads are of sandstone.
*(Harper's House, Berrima, N.S.W. Restoration architect: Clive Lucas.)*

The combination of brick and stonework is an important characteristic of many colonial buildings.
*(Forcett House, Fawcett, Tasmania, 1830s.)*

## EARTH

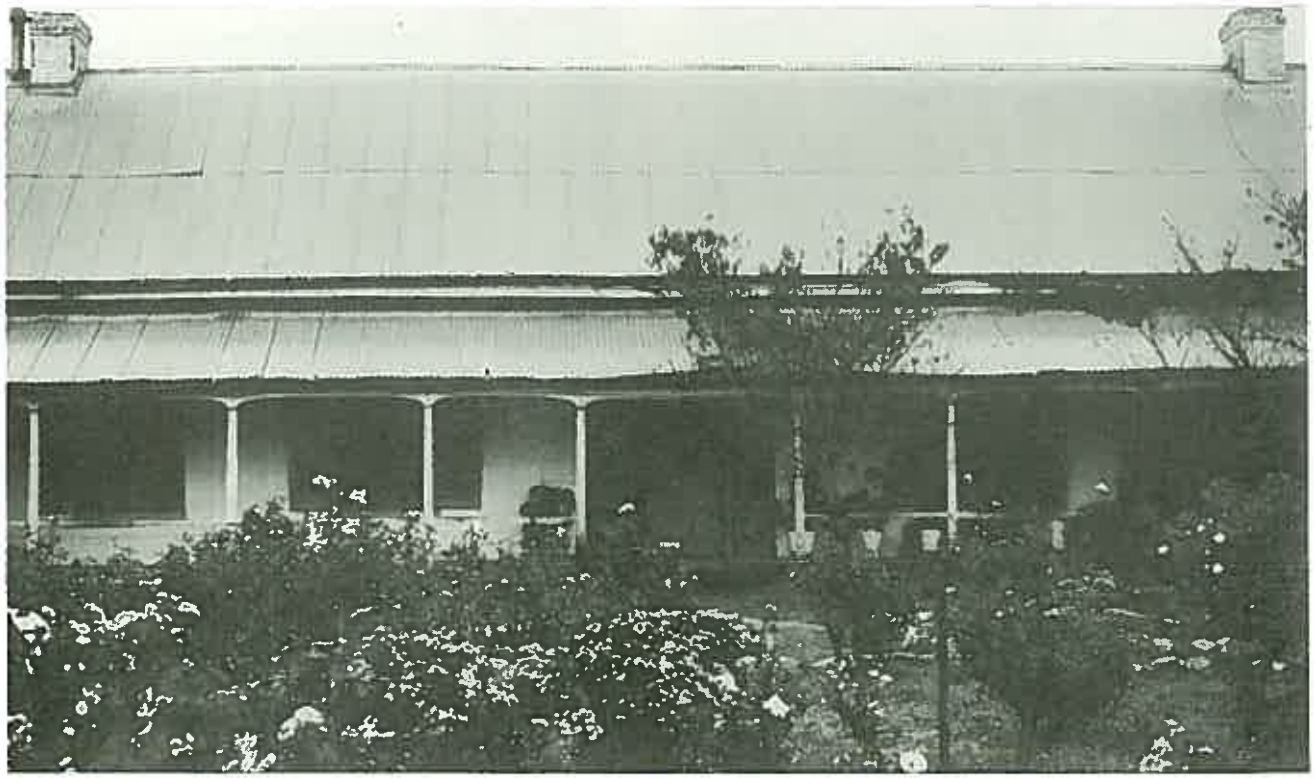
One of the most basic and ancient ways of building walls is with earth. There are essentially four main types of construction –pisé, cob, adobe, and wattle and daub.

Pisé is built up of rammed clay or earth using timber formwork rather like modern concrete walls are made. Cob is more primitive, no formwork being used. The mud is mixed with gravel and straw and merely built up in layers. This gives buildings a less regular appearance than the more precise pisé. Both forms are usually plastered and sometimes colourwashed. In sophisticated walling the plaster will be marked out to simulate stone and often it will be difficult to tell that the core of the wall is not of stone or brick.



Exposed cob wall. *(Hamilton Downs Homestead, near Alice Springs.)*

In this deteriorated pise wall the timber reinforcing is seen. *(Stables, Boree Cabonne Homestead, Borenore, N.S.W.)*



Quite substantial buildings were built of Pise. The only way to tell is if the render is off. *(Cunningham Plains, Harden, N.S.W., 1862.)*

Adobe is a primitive form of brick construction. Masonry units are made of mud and straw, sun dried, and then built up in much the same way as a brick wall. It is sometimes found combined with brick and stone or as nogging in a stud frame.

Wattle and daub is the construction of a woven mat or branch framework which is dabbed with mud on both sides and whitewashed.

Adobe bricks used in the construction of an 1830s house near Orange, N.S.W. *(Bookanan, Byng.)*

An 1870s photo of a wattle & daub cottage at Hill End, N.S.W. *(Holtermann photograph.)*

The rendering has broken down revealing that the cottage is of pise construction. *(Canowindra, N.S.W. Photo: Ian Stapleton.)*

# MORTARS

Solid masonry walls are bedded in mortar. It is important to realise that wall thickness and bonding give them strength not mortar. Mortar is purely to level the stones or bricks and distribute the weight of the unit evenly. Mortar also has a sacrificial role to play in that it draws off the salts and as a result breaks down instead of the masonry.

Lime combined with sand in the proportion of 1 to 3 is a traditional mortar mix although in many areas, particularly in the first half of the nineteenth century when, in some areas, lime was extremely scarce or just not available, mortars without lime are prevalent. Thus one should not be surprised to find a wall which is bonded entirely of mud, and one should realise that such a wall has survived for well over a century without the help of lime let alone cement. Mortars without lime are also found in comparatively recent buildings, in remote areas of the outback.

As a rule, older mortars used shell lime and deposits of seashells will often be found. Later, after limestone deposits were discovered, the use of shell lime declined.

Various patented cements seem to have been used after about 1830 but usually for external rendering rather than for mortar. Certainly as late as 1900, lime mortars seem to have been preferred although cement renders had been popular for 50 years. Cement mortars seem only to have been used in areas of stress such as arches. An early example of external cement rendering, Lyndhurst in Sydney, built between 1834-37 by the leading architect John Verge, has brick walls bedded in shell lime mortar, internal plaster of shell lime, but the external walls are rendered in a patent cement. Also, at Highfield (1835) at Stanley, Tasmania, a cement of some sort was used for rendering the decorative chimneys.

The chimneys on this 1830s house are rendered in an early patented cement. *(Highfield, Stanley, Tasmania.)*

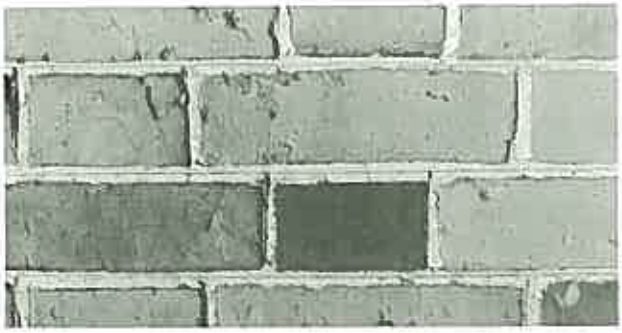
An example of shell lime mortar. Pieces of shell can actually be seen. *(Vaucluse House, Sydney.)*

This shows the beneficial effects of a soft mortar. In this neglected wall the mortar has gone and left the bricks intact. *(Outbuilding, Parsonage, Port Arthur, Tasmania.)*

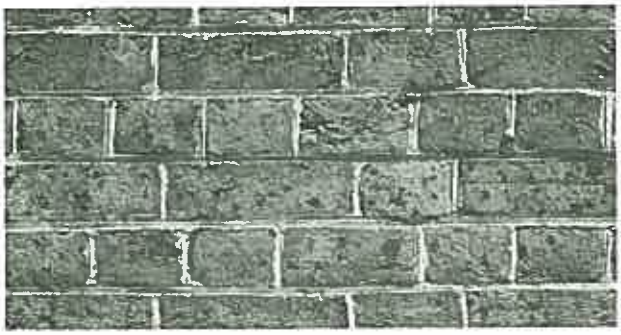
A typical example of the effect of rising damp on the exterior of a brick building. *(Beulah Vista, Church Street, Canterbury, Sydney.)*

# POINTING

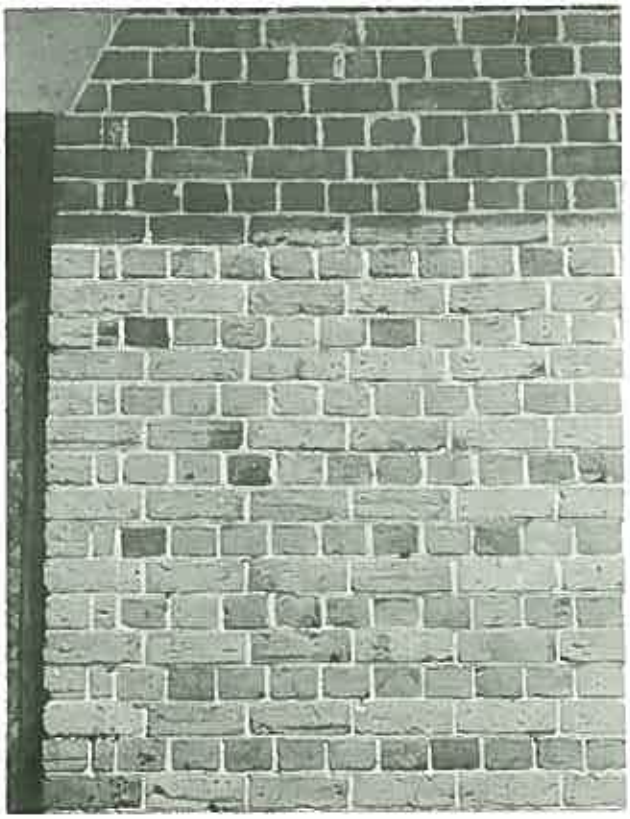
Pointing, or the finish of the mortar joint between the masonry, can vary. Brick jointing is fairly consistently struck up although the more correct struck down, to throw off moisture, will be found.



An example of pointing which has been ironed to make the joints appear finer than they are. This was a common 18th century practice. *(Forcett House, Fawcett, Tasmania, 1830s.)*



Another example of struck jointing.
*(St. Thomas's Church, Narellan, N.S.W.)*



A good example of 1840s English bond brickwork which retains its original struck jointing
*(Independent Chapel, The Hunting Ground, Tasmania.)*

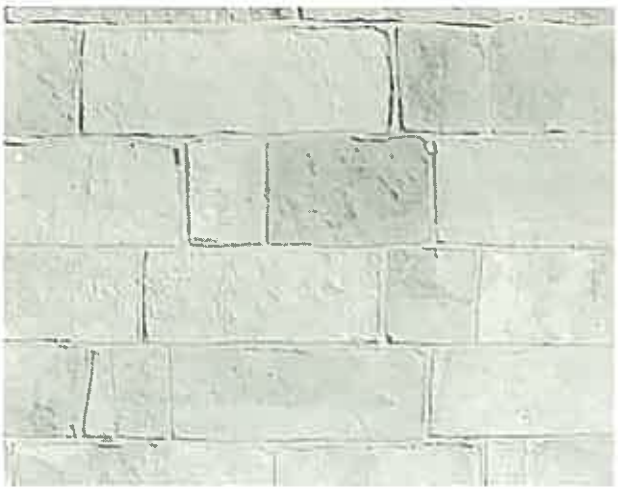
In finely rubbed work a mason's putty joint is usually employed.
*(Pitt Street Parish Church, Sydney.)*

An example of badly repointed brickwork. Cement has been used and there has been no attempt to strike the joints.
*(Bob's Hall, Lancer Barracks, Parramatta.)*

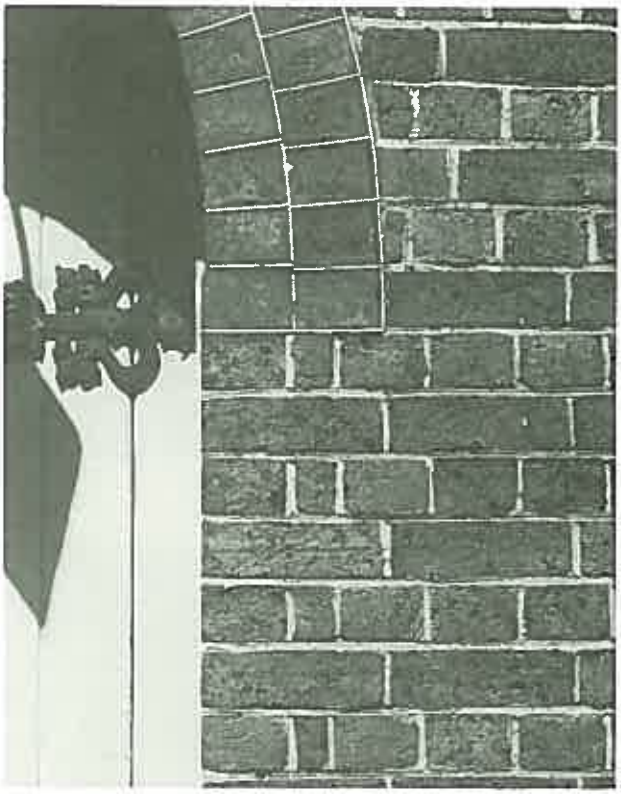
Squared stone walling can be similarly finished although in very fine rubbed work a mason's putty joint was commonly used to calk up the joint. This sort of work was usually confined to special features. In rougher random walling jointing can vary greatly. It was common practice in some areas to make the random or even squared rubble look better by smearing the mortar over the surface of the stone then ironing on, or tuck pointing on, false jointing to give the illusion of finer masonry. Such techniques are common in South Australia, Victoria and in the Northern Territory.

The tuckpointing of this rubble constructed church is an important detail.
*(Church of the Immaculate Conception, Carcoar, N.S.W., 1870.)*

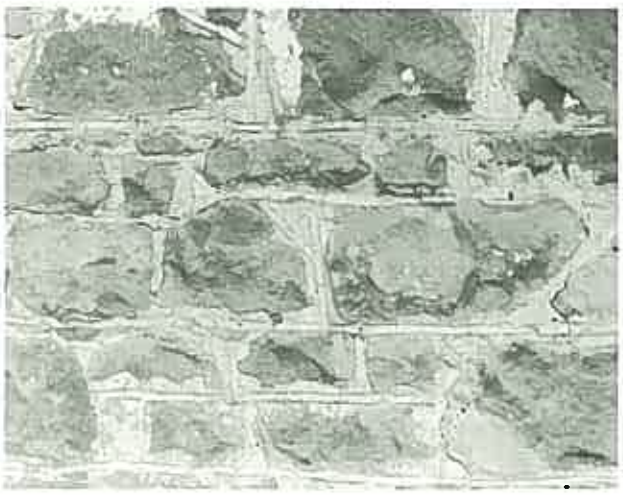
In this example tuckpointing has been used to make the masonry appear finer than it is. *(Uniting Church, Beechworth, Victoria.)*



Bad repair of jointing such as here can make the walling look worse than it is. *(Ebenezer Church, N.S.W.)*



Tuckpointing of brick buildings was usually restricted to arches for most of the 19th century. *(St. Thomas's Church, Narellan, N.S.W.)*



An example of rubble walling improved in appearance by the ironing of the mortar joints. *(Lyne Station, Hamilton, Victoria.)*

Tuck pointing, a raised form of jointing, was particularly popular at the end of the nineteenth century and is almost universal for the treatment of facades to Edwardian brick buildings. It was used from the beginning of the nineteenth century but in those earlier times it seems to have been confined to arches. Often in brick buildings flat gauged brick arches were finished in a thin red brick coloured plaster and then white jointing tuck pointed on. In many instances the apparent joint does not coincide with the actual joint behind.

Early brick arches were often covered in red ochre and tuckpointed. As with all tuckpointing it is an attempt to make the jointing appear finer than it is.
*(Outbuilding, Strathmore, Nile, Tasmania.)*

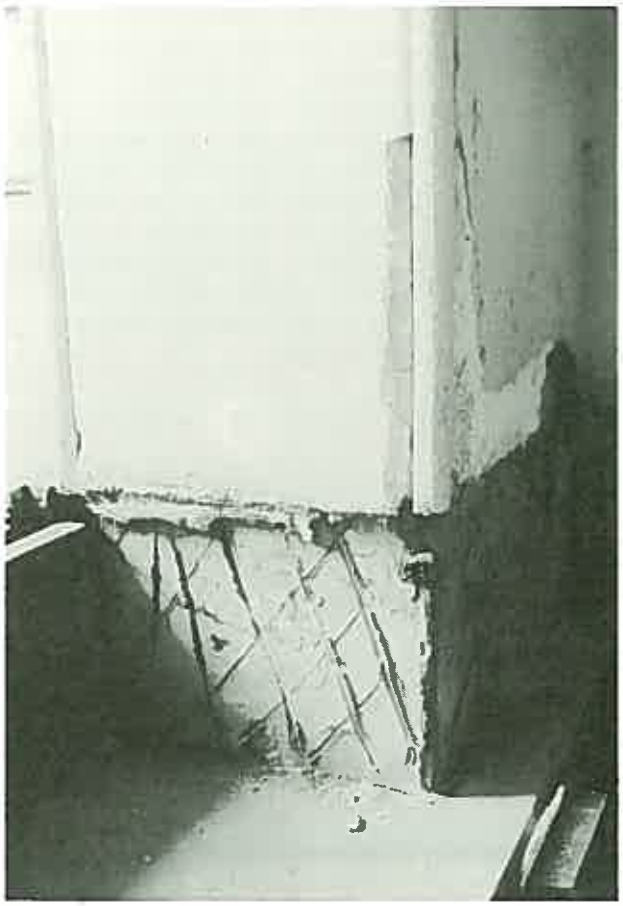
The emphasis on the front wall continued into the period between the wars, better quality bricks and tuckpointing being popular. *(Cottage, Haberfield, Sydney.)*

Most Edwardian brick buildings have their front wall tuckpointed. *(Verger's Cottage, St. John's, Parramatta.)*

# FINISHES

Internal walls in the period under discussion were normally plastered smooth, except perhaps in barns, outhouses, and often in kitchens and domestic offices. No important room would be left unplastered except in a crude or temporary situation. Indeed even in primitive gold rush buildings great trouble was taken to achieve at least the sense of a smooth internal surface by all sorts of mocked up devices.

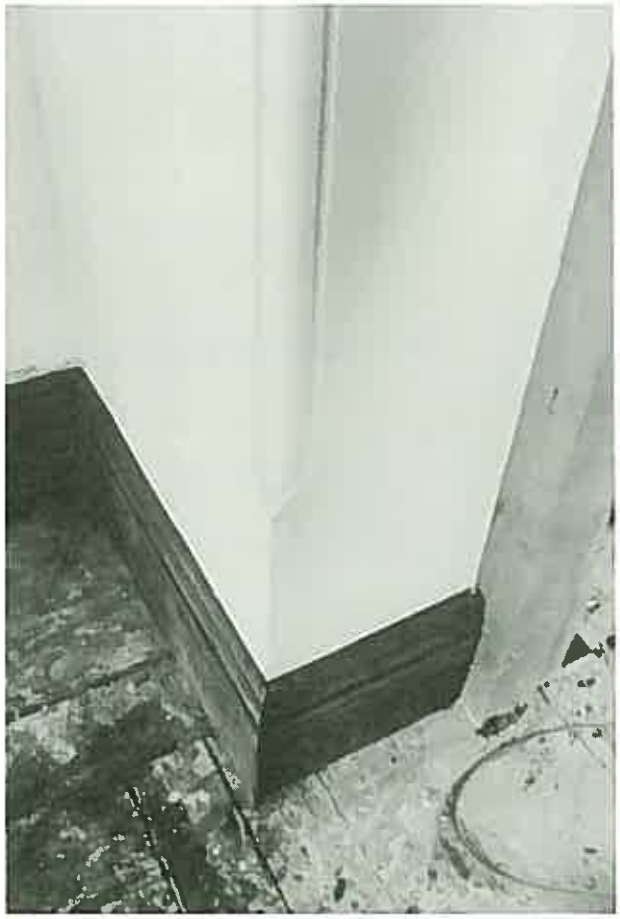
Like mortars, plasters will be found with virtually no lime in them. But the most desired finish at least until the last two decades of the nineteenth century was a mixture of lime, sand and teased cow hair applied in two coats (scratch and float coats) and finished in a smooth finishing coat of lime and sand or later gypsum plaster. This surface is quite soft; hence the importance of architraves and skirting boards in areas likely to be knocked. External corners such as those at a chimney are usually finished with a timber staff mould, sometimes with a quirk. With the introduction of cements such corners were often run in render, stop chamfered or moulded. Even after cements were used the finishing coat was still a perfectly smooth white plaster.



Timber staff mould at the external corner of the soft plastering. The exposed scratch coat is to be hidden by the skirting board. *(The Rectory, Seven Hills, N.S.W., 1892.)*

Face brick interiors were almost always painted. *(Kitchen in terrace house, 26 Derwent Street, Glebe, Sydney.)*

Architraves and skirtings are fitted to protect the soft plaster. *(Lyndhurst, Sydney. Restoration architect: Clive Lucas.)*



Edwardian staff mould run in cement. *(Harrisford, Parramatta.)*

Where walls were plastered externally the commonest technique was to mark out the finished surface in imitation of dressed free stone in courses usually 1'0" (300mm) high. In the first half of the nineteenth century the external plaster was the same soft hair plaster that was used inside and details like timber staff moulds are commonly found, although window sills, thresholds and strings are often dressed stone. From at least the eighteen thirties composition materials using various cements were introduced. The very name Portland Cement is derived from the fact that it was first seen as a cheap way to simulate Portland stone, the most favoured London facing material at the beginning of the nineteenth century. From the middle of the century cements came into their own and suburbs, particularly in Melbourne and Sydney, illustrate the skill of the plasterer. Like cakes, brick buildings are "iced" with cement render in the most decorative way to simulate the art of the stonemason.

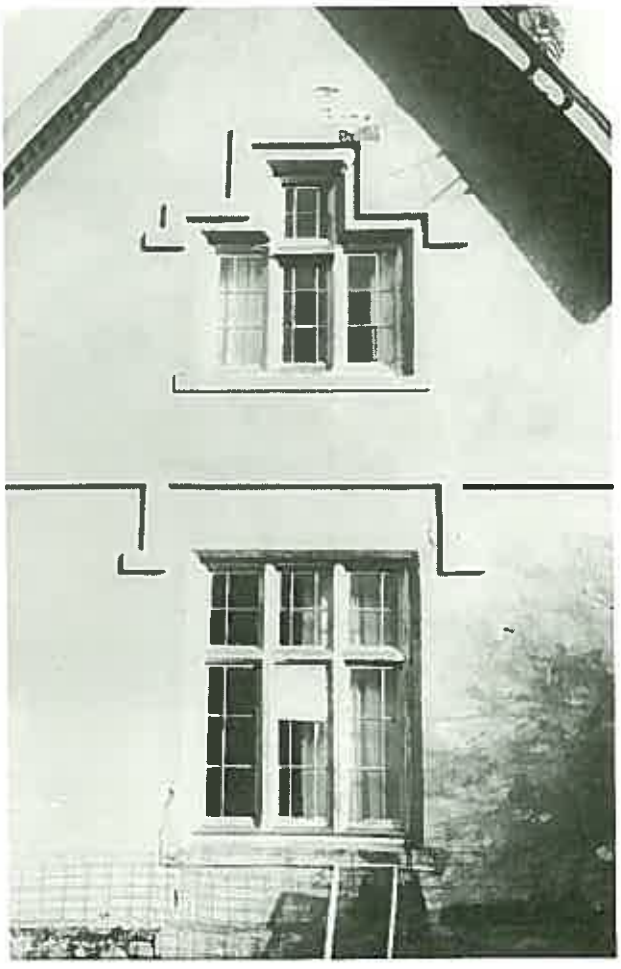
It should be appreciated, however, that rendering is not purely decorative; it is also functional and meant to keep the solid walls waterproof. Beware of removing such rendered finishes, for much aesthetic and technical damage will be done.

Another common external finish in the first half of the century was rough cast. The rubble stone house of Sir Henry Brown Hayes at Vaucluse in Sydney, built before 1820, was in fact rough cast.

Rough cast is a mixture of lime, sand and pebbles. It is commonly used on less important elevations and on outbuildings. Many examples still exist in Tasmania.

A late Victorian brick house encased in elaborate cement decoration. *(House, 3 Arundel Street, Glebe, Sydney.)*

The masonry walls are cement rendered and marked out to look like detailed stonework. *(Iona, Darlinghurst, Sydney, 1890.)*

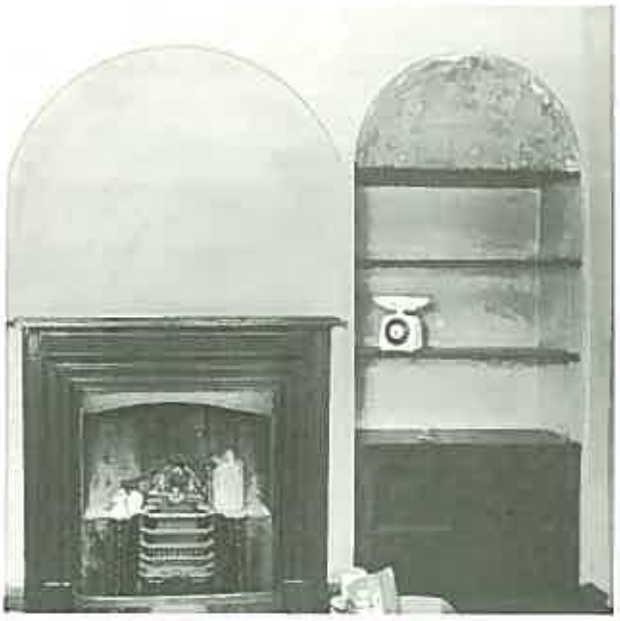


Rough cast was often employed for picturesque or farm buildings. *(Kelvin Grove, Conara, Tasmania.)*

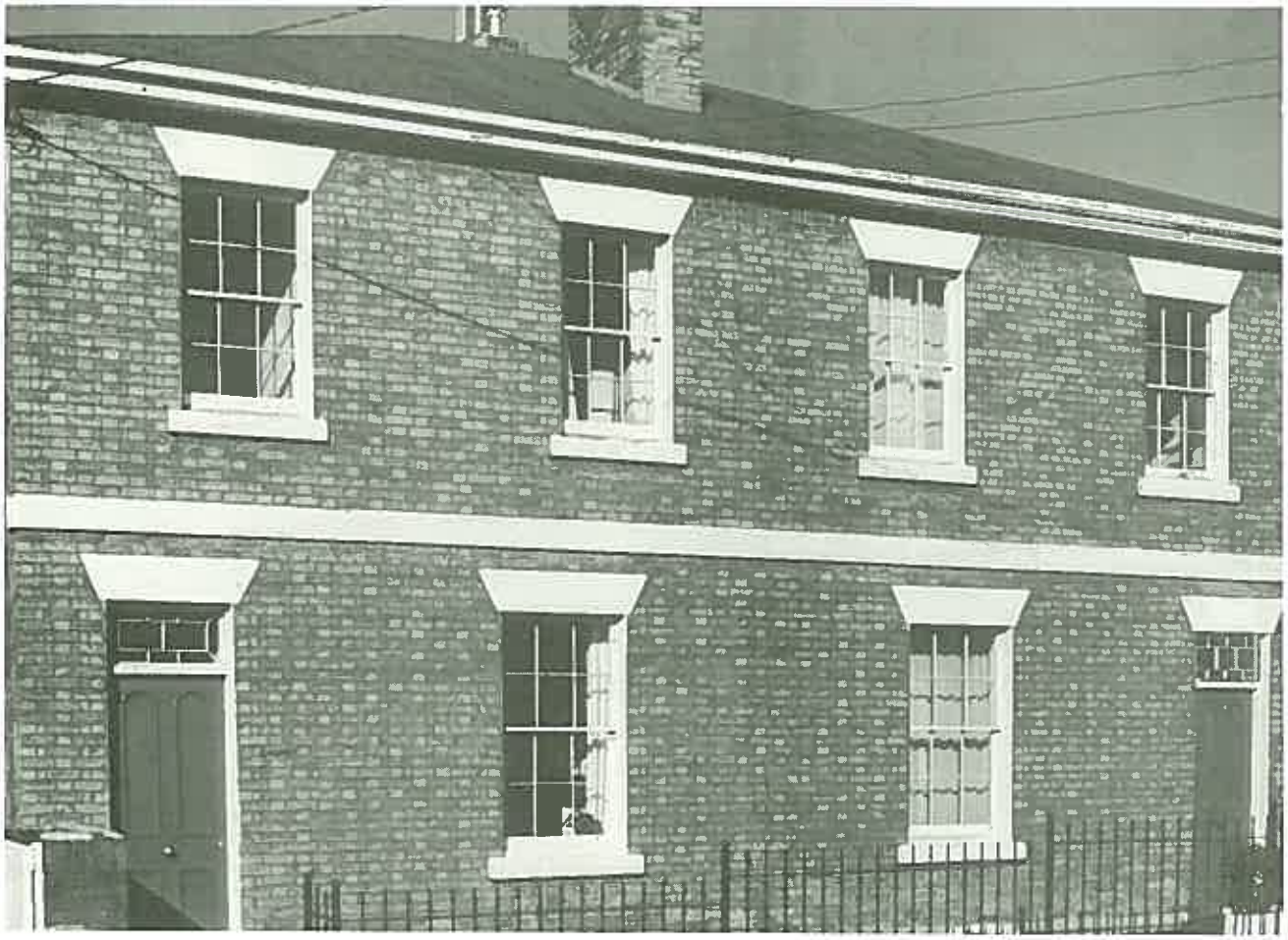
# PAINTS

As has been said rough stone or brickwork and plaster were often painted. Almost always, this seems to have been an ochre or stone colour. Distemper and particularly lime washes were also prevalent, especially in rural areas. It was quite common to paint brick houses with red oxide in oil with the joints sometimes tuck pointed. Later, particularly in Edwardian times, brickwork was simply oiled. Such oiling of brickwork is often confined to the main elevation. There are many examples of the red oxide techniques still to be found in Hobart.

A fresh coat of limewash is the best traditional finish for soft sandstock brickwork.
*(267 George Street, Windsor, N.S.W. Restoration architect: Clive Lucas.)*



A fresh coat of distemper. *(Harrisford, Parramatta.)*



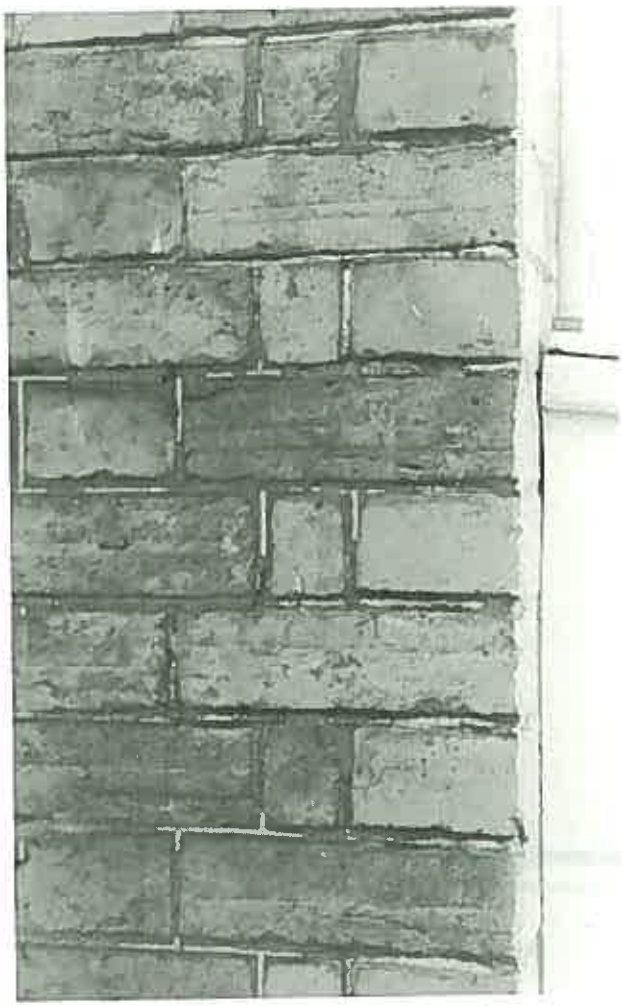
Finished in red ochre and oil to help waterproof the porous brickwork. *(50 Hampden Road, Battery Point, Hobart. Photo: Wesley Stacey.)*

In the last half of the nineteenth century lead based oil paint became common on many rendered exteriors. However, there are examples of both hair plastered and cement rendered buildings which were unpainted originally. Usually painting has resulted from later patching or repair. It is very difficult to repair unpainted plastered or rendered surfaces invisibly. Tasma Terrace, the headquarters of the Victorian National Trust, is a good example of an unpainted cement rendered building. Repairs to the render, however, are readily discernible, but these can be expected to "weather in" over a period of time.

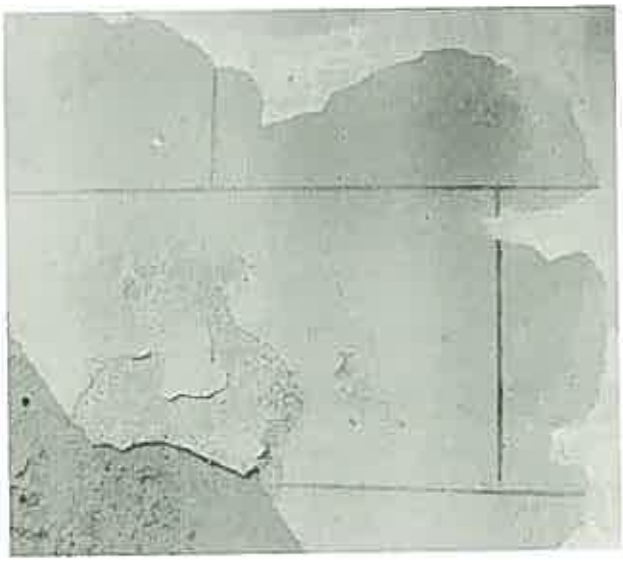
Hair plastered walls left unpainted usually had the scored jointing lines marked with a crayon or lead pencil, a technique which was often repeated after the walls were lime washed.

Inside, the smooth plastered walls were painted or wallpapered. Distemper or Kalsomine were most common. Distemper is a mixture of whiting and size to which colour is added. It should be stated that most of the earlier paints certainly did not have as good a finish as those we would find acceptable today. Oil paints were also used, particularly where stencilled dado or marbled decoration was carried out.

It is important to appreciate the breathing capacity of finishes like lime washes and distempers. While they help throw off most moisture, they allow some moisture in and allow it out also. Witness the colour change in a lime washed building after a rainstorm. With solid walls it is important to maintain this breathing quality. There is nothing wrong with lime washes but if a modern paint **must** be used it will be best if it is acrylic-based. For interiors there is nothing wrong with Kalsomine or distemper so far as the wall is concerned. Its disadvantage is its washability but that is outside the scope of this Bulletin.



Like arches red ochred facades were often tuckpointed. *(318 Liverpool Street, Hobart.)*



In this 1830s example the lime plaster had had its scored lines finished with crayon and originally was left unpainted. *(Mulgunnia, Trunkey Creek, N.S.W.)*

Cement became appreciated for itself and in many late Victorian buildings was left unpainted. *(6–8 Church Street, Hobart.)*

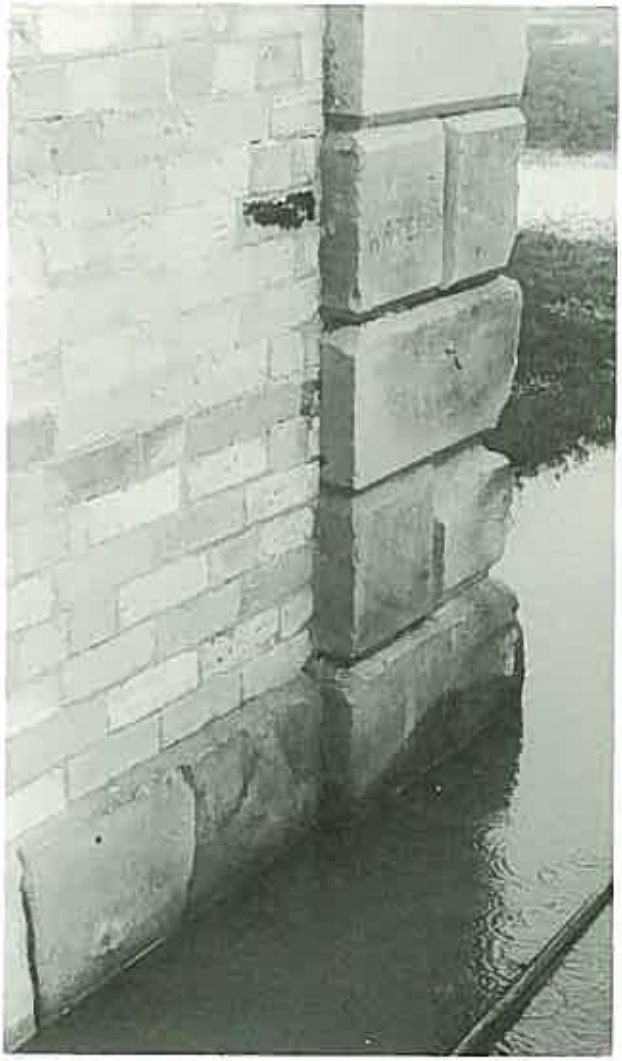
# DAMP PROOF COURSES

Often rising damp is the result of falling damp or bad drainage. It will be advisable to study the building and put it in order before undertaking a major job like cutting in a damp proof course.

First make sure the roof is watertight and that downpipes do not leak and that water gets well away from the building in the drainage system. Also make sure garden beds are not too high and subfloor ventilators are all clear. Commonsense may save a lot of trouble and it would be wise to consult an architect who understands old buildings before undertaking any major work.

The best way to prevent rising damp is undoubtedly to cut in a traditional damp course. In the past slate, bitumen and lead were used. Today we mainly use bitumen coated lead, copper or aluminium. Aluminium is most common, but P.V.C. and polythene coated aluminium are being used increasingly. If the wall is brick of 14" or less thickness it is a reasonable proposition to cut in a traditional damp course as low down in the wall as possible. This can be done with a saw or by breaking holes in the wall and gradually working around. Both techniques, however, require great skill. In thicker walls the building will probably be lowered by 3mm (⅛") by these processes. However, many walls are of rubble stone or extremely thick and it is not possible to cut in a damp course by the above methods. Diamond saws are being used in Europe but so far this has not been tried here. There is one technique being used here which cuts a slot by means of a water jet. However, as with the use of moisture to remove paint films, this technique can lead to other problems and side effects.

Cutting in dampcourse by removing sections of the wall. *(Willandra, Ryde, Sydney.)*



If the building is standing in water after a heavy shower of rain you can expect to have damp problems.

Cutting in a dampcourse in a 9" wall by the means of a masonry saw. *(Cooma Cottage, Yass, N.S.W.)*

There are numerous patented systems for curing damp such as impregnating the wall with various fluids which are absorbed, in effect making a section of the masonry an impermeable barrier. The problem is of course that the core of the wall may be full of voids, creating many weaknesses. It is probably best to regrout the base of the wall before trying this system.

Another system is electro-osmosis which involves threading a copper wire in and out the base of the wall. The theory is that the movement of water creates a current and by earthing the wire you will stop the movement. But the system may fail if the wires oxidise in the salty mortar, or break, and there is considerable doubt about its effectiveness.

Another technique involves bedding earthenware tubes in the wall, through which the moisture is encouraged to dry out. Such a technique means ventilation holes at approximately 450mm centres around the base of the walls. These are unsightly and where ground salt is severe the tubes clog up with salt anyway.

Once the moisture is cut off, the wall above the damp course will begin to dry out. If the wall is salty this will mean that the masonry will start to break down as the salts are brought to the surface unless precautions are taken. A sacrificial coat of plaster is probably best applied to both faces of the wall before the insertion of the damp proof course. The salts are brought to the surface of the plaster and it breaks down. Eventually the plaster can be removed. Such plasters should be a weak mixture of lime and sand, say 1 to 4 or even weaker.

One of the techniques used in South Australia is that of removing the salt affected masonry during the process of building in a damp proof course, washing it thoroughly in clean water and then building it back into the wall.

Whatever happens to the masonry wall, plaster affected by salt damp should be removed, usually to a height of 150mm above the height the damp has reached. When the wall is replastered there is always the risk it will act as another sacrificial plaster and break down in some areas but this cannot be avoided if you wish to make the building habitable quickly.

Injecting walls with a fluid is one patented attempt at stopping rising damp. *(Malahide, Fingal, Tasmania.)*

Fitting sacrificial plaster to salt contaminated walls will draw off the salt. *(Cellar walls, Lyndhurst, Sydney.)*

# PROBLEMS

There are usually problems associated with masonry walls, particularly if they have not been well maintained or were wrongly constructed in the first place. It is true to say that the first settlers in this country did not appreciate how generally unstable Australian soils are, at least by European standards. Thus there are many buildings which, because of this lack of knowledge, have inefficient footings. There are also those which have been cheaply or badly constructed. To rectify bad footings requires underpinning, a costly and disruptive business. So unless the structural stability of the building is at risk it is probably better to put up with a few minor cracks which open and close with the weather. Cracking is not confined to old buildings. Despite modern knowledge it is often a problem in new buildings for one reason or another.

If the stability of the building is at risk it is best to consult an engineer or architect who understands old buildings. As a rule such people can be found by contacting the various State offices of the National Trusts.

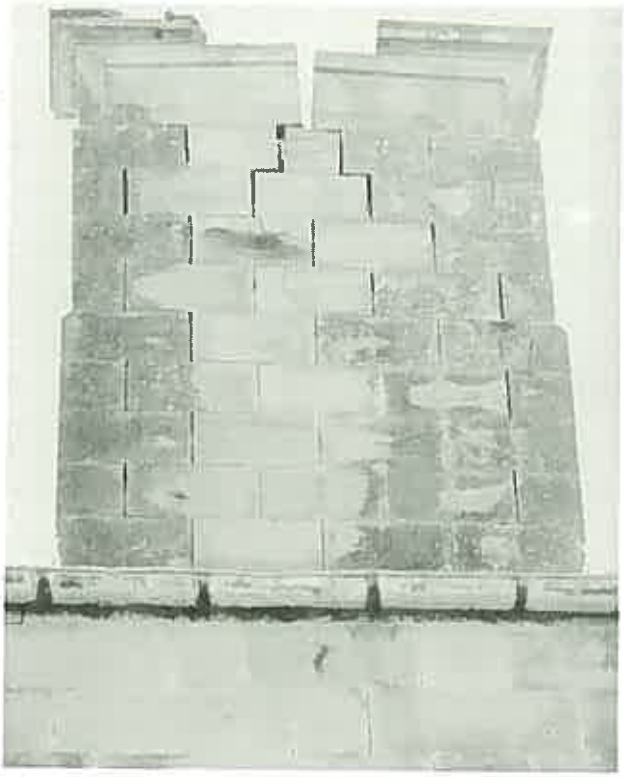
Much more common problems are, however, caused by moisture both falling and rising.

Once the pointing, particularly in copings to parapets and chimneys has failed, this leads in the first place to spalling and deterioration of masonry and in the long term to the eventual spreading or disintegration of the wall. Thus a neglected chimney will be wider at the top than further down. If the neglect is not halted then of course collapse takes place. Rubble walls are particularly vulnerable to collapse, resulting from moisture getting in at the top and into the porous core of the wall.

Structural movement such as this will probably mean the services of an engineer are required.
*(Goldfinders, Kurrajong, N.S.W.)*

The effects of inappropriate repairs and rising damp.
*(Pitt Street, Parish Church, Sydney.)*

Inadequate footings plus the effects of rising damp lead to wall collapse. *(Coolangatta, Berry, N.S.W.)*



The coping has long gone and the chimney has reached the point where collapse is imminent.
*(Aberglasslyn House, Maitland, N.S.W.)*

If it is in an advanced state of disrepair it may mean that the wall will have to be taken down and rebuilt. This, however, should be seen as a last resort. If it is a coursed building and there is sufficient masonry above door or window heads it may be possible to tie the building together by secreting continuous stainless steel wires in the bed joint so that they fully encircle the building and tie it together at the top. However, precaution should be taken to insulate the wires from lime mortar.

Where a wall is failing because its core has broken down it is often possible to regrout the masonry. This is achieved by close boarding the wall on both faces or sealing the joints and cracks with wadding, creating weep holes at the bottom, washing out the old core, and then running in a new grout, working from the bottom up in say metre high stages. The grouting mortar should be kept consistent with the mortar which traditionally has bedded the wall.

Both techniques require expertise and the services of an architect would be advisable. From these remarks it should be seen how important it is regularly to maintain the jointing or cappings to parapets, gables, chimneys and wall tops generally. Regular maintenance will avoid the most costly repairs.

Probably the most difficult problem with old walls is rising damp. Very few walls built before about 1870 had damp courses and even if they did they have probably failed by now.

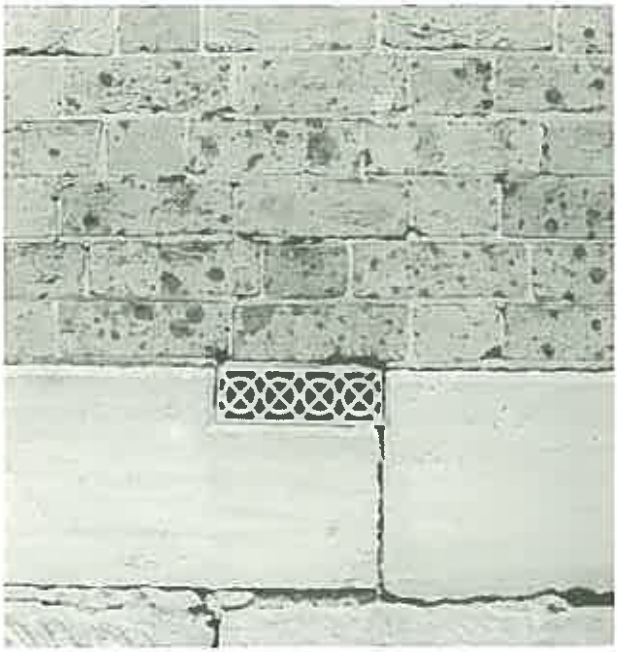
Severely neglected brickwork in which the effects of rising and falling damp can be seen. *(Commandant's House, Port Arthur.)*

Exposed Sydney sandstone after a century of weathering in an urban environment. *(St. Andrew's, Balmain, 1855.)*

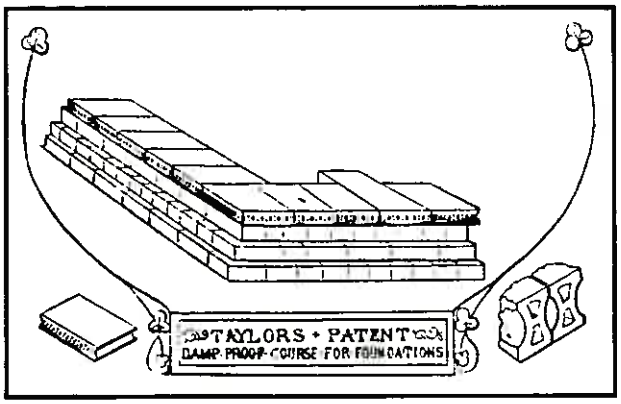
The breakdown of the coping has lead to water entering the core which ends with collapse.
*(Garden Wall, Rosedale, Campbell Town, Tasmania.)*

It is not just the rising moisture that is a problem but also the ground salts which come with it. Salt is a problem from region to region and is particularly serious in the area of Adelaide. Undoubtedly the most effective way of preventing rising damp is to have a good airy but not draughty subfloor area. Buildings with extensive cellars for example, usually have no problems except in the cellar itself, which one accepts. Many problems are caused by removing subfloor ventilation spaces – even quite minor ones. Closing over wall ventilators, and replacing timber floors with concrete slabs on membranes are two possible ways of introducing rising damp into an old building where there is no damp proof course or where the damp proof course has broken down. Even with a timber floor which is not tongued and grooved, putting down a fully fitted carpet or linoleum could have serious effects. In many old buildings it is only by means of the gaps between boards that the subfloor airs itself.

If extensive work below floor level is being carried out the opportunity should be taken to increase ventilation wherever possible. It should be appreciated, however, that deterioration of masonry is caused by the process of drying where salts are present. Thus if the wind draught is too severe it will encourage drying where it passes across the surface of the wall. At door jambs and reveals one often sees more serious deterioration than elsewhere. So try not to disturb too much the traditional equilibrium of the building. Never cement render in an attempt to repair fretted masonry. This merely makes the problem worse by driving the moisture further up the wall. Cement is one of the greatest enemies in the fight against damp in solid masonry walls.

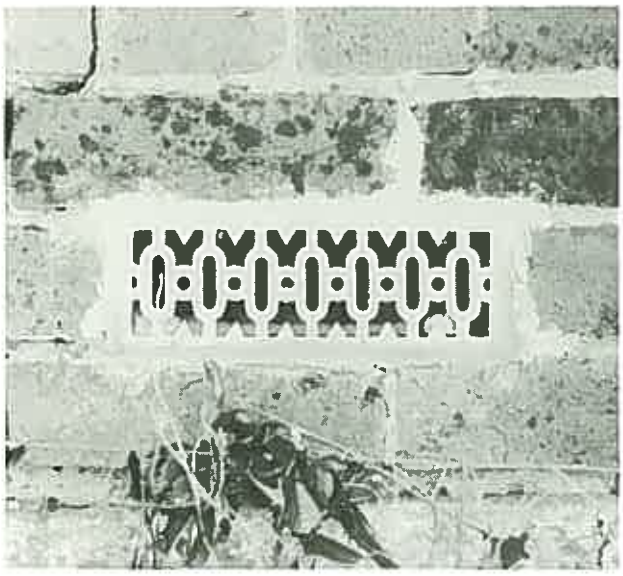


Traditional 19th century subfloor ventilation is often inadequate and should be increased. *(Riverview, Dundas, N.S.W.)*




Taylors patent dampcourse. A 19th century attempt at combatting rising damp.

A similar dampcourse to Taylors employed in a New South Wales Public building. *(Kenmore Hospital, Goulburn, N.S.W.)*



19th Century ventilators can be copied for use in increasing ventilation. *(29 North Street, Windsor, N.S.W.)*

# REPAIRS

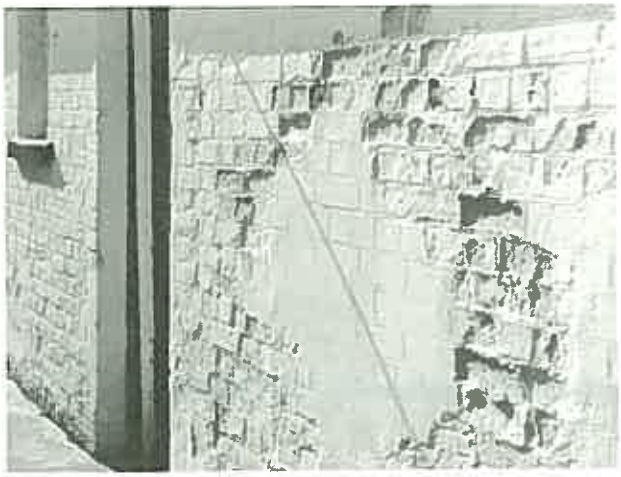
Most of the points relating to repairs have probably been covered but it should be reiterated that one must respect the techniques used to construct the building.

When one repairs a brick wall, the bricks must be as close to the original as possible, and the jointing must be the same both in appearance and in consistency as the original. Lime mortar must be used in almost all cases, except in very exposed positions where a small amount of cement is advisable. In repairing stone work it must be seen as invisible mending, i.e., the tooling must be in the spirit of the original and if possible the stone used from the same quarry.

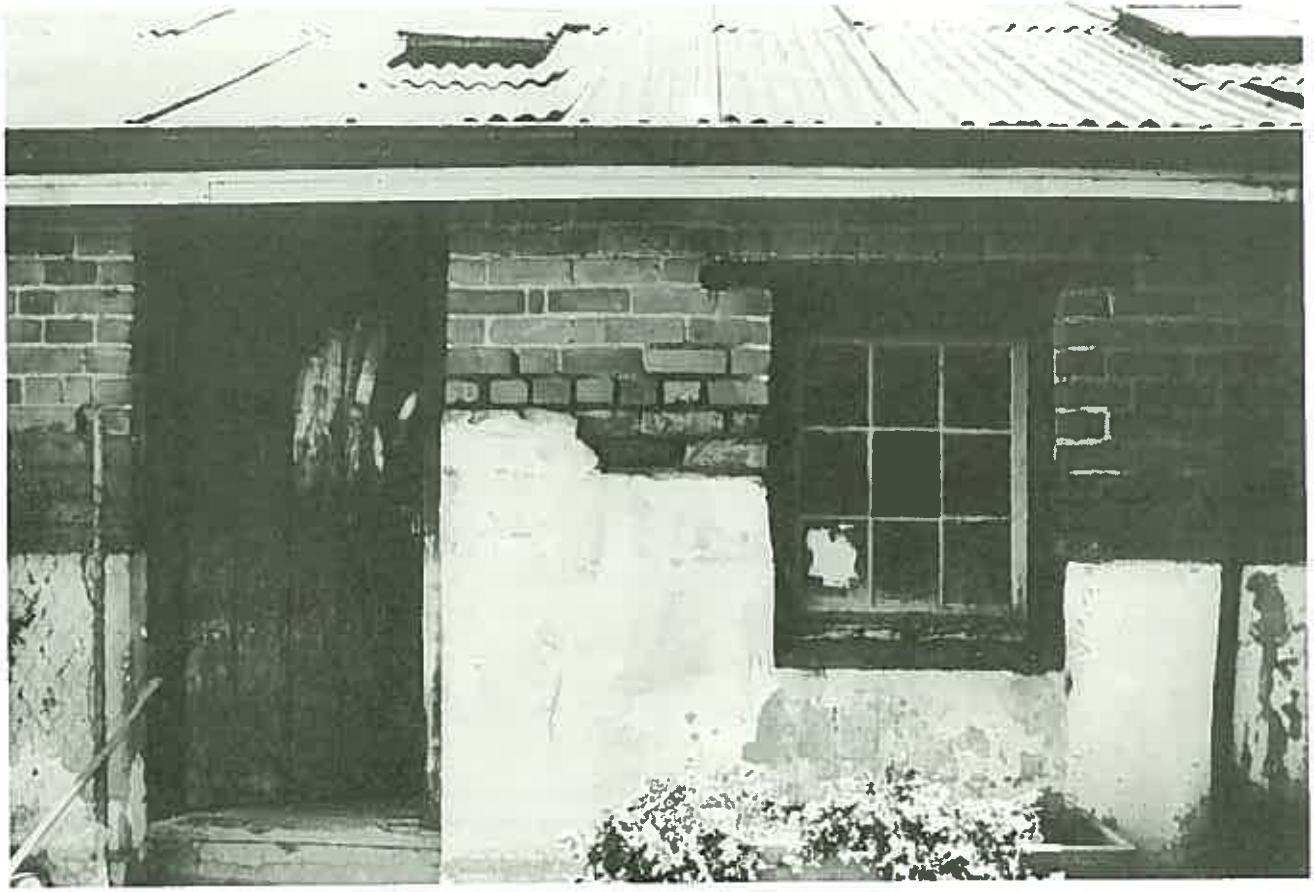
Try to save as much of the old work as you can for as long as you can. Try to distinguish good honourable wear and tear from mutilation.

As John Ruskin wrote, *"count its stones as you would jewels of a crown".*

Advanced decay at a cellar opening caused by draught on severely salt contaminated masonry. *(Lyndhurst, Sydney.)*



Putting hard cement patches in a wall only leads to the breakdown of the surrounding original surface.
*(Priest's House, Port Arthur, Tasmania.)*



Rendering walls only drives the rising damp further up the wall. *(Faversham, York, W.A.)*

**Following are some traditional specifications used in masonry restoration:**

## APPENDIX I
### MORTAR
All mortar used in making good old work to be lime mortar.

**Materials:**

*Lime:* Freshly burnt lime (not dehydrated). The lime should be slaked in a tank (min. 2 hours) and stirred during slaking. Lime should then be sieved into a box and allowed to cool.

*Sand:* Sharp, clean and free from impurities.

**Mixture:**

3 parts sand
1 part slaked lime putty
The mixture should be allowed to stand for a minimum of 14 days before using.

## APPENDIX II
### PLASTER
All plastering is to be of lime.

**Materials:**

*Lime:* Freshly burnt (not dehydrated) slaked for minimum of 2 hours and stirred during slaking and run through a fine sieve and allowed to cool. All core must be removed from the site.

*Sand:* Sharp, clean and free from impurities.

*Animal Hair:* Cow hair well beaten up before being mixed. (Ex. Tannery)

**Mixture:**

3 parts sand
1 part slaked lime putty
1 part hair (teased up)
The mixture should be allowed to stand minimum of 14 days before using. Use coarse sand for the initial coats, which must be scratched to provide a key for further coats or for the finishing coat.

**Finishing Coat:**

1 part hard lime plaster or fine sand
3 parts lime putty
Finish with steel float. The final coat will need wetting and setting to eliminate crazing.

## APPENDIX III
### LIME WASH
Make 8 gals of lime putty, put in colour while slaking, sieve and allow to cool.
Add 5lb of dry calcium chloride mixed with water and added to lime putty to give desired consistency.
Then add 4lb of Alum powder and 1 gallon of hot tallow.
Mix well and apply two (2) coats.
The mixture is to be applied hot.

## APPENDIX IV
### RED OXIDE WASH FOR BRICKWORK
**Materials:**

*Oil:* Solpar oil (Ex. Taubmans).

*Colour:* Red oxide or sienna in powder form.

**Mixture:**

Mix very small quantity of colour with oil as necessary to make a translucent wash. To lose the gloss the mixture can be broken down with mineral turpentine.

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