

# INFORM

INFORMATION FOR HISTORIC BUILDING OWNERS

## Indent Repairs to Sandstone Ashlar Masonry



This INFORM provides an introduction to the practice of replacing damaged stones in an ashlar built sandstone wall. Referred to as indenting, the technique involves replacing badly decayed or damaged blocks with stones of similar dimension and physical characteristics.

Following on from the Masonry Decay INFORM this guidance focuses on:

- **The characteristics of ashlar build**
- **Why aesthetic factors alone should not dictate replacement**
- **Why the mineralogical composition of sandstone is important**
- **How to carry out indent repairs**

## **Characteristics of ashlar build**

In creating an ashlar build stonemasons were guided by observing the natural qualities of the stones they were using. The identification and alignment of the stones' bedding plane - the way in which the loose sand grains were laid down in geological times before the stone was properly formed - needed to be properly understood. Sandstones' inherent strength comes from this feature and the various minerals that, geologically, bound the individual grains of sand together.



As the natural bedding planes normally lay horizontally, individual sedimentary stones, such as sandstone, were similarly aligned by the masons with their natural bedding planes set horizontally. This offered their buildings considerable structural strength.

When nature was ignored, the performance of sandstone was less effective. This is particularly found where ashlar block walls were built “on cant”, with the geological bedding set vertically, rather than horizontally. When “face bedded” in this way the stone’s strength is not used to advantage, and the outer faces of the stones become prone to failure through a process know



as delamination. This effect can trigger the need for a considerable degree of indent work, as the characteristic failure of the bedding planes can lead to the complete loss of the exposed face across a building's elevation. Fortunately, it is more usual to find buildings constructed in the appropriate manner, with only a few individual stone blocks ever requiring attention.

### **Aesthetic factors alone should not dictate replacement**

Best practice should always aim to retain as much original stonework of a building as possible. It also recommends the use of minimal intervention techniques involving the least physical disturbance to the building. The Masonry Decay INFORM outlines aspects of authenticity, aesthetics, structure and function that should be considered when deciding whether or not to replace an eroded stone. This INFORM addresses the next step.

An ashlar wall constructed of squared stone blocks is inherently stronger than a rubble stone structure. As a result it can withstand a considerable degree of erosion and distress before any indenting work is required. However, it is commonplace to find that unnecessary indent work is carried out when only superficial, but aesthetically concerning, surface damage to stones has occurred.

As a result of extreme decay, structural distress, or the loss of purpose, circumstances can occasionally emerge where the need to indent is inevitable. In such situations, once a decision is taken to start indenting it can be equally difficult to decide where to stop. Stones should only be replaced when they have decayed to such a degree that they affect the structural stability and function of the surrounding stonework.





## **Why the mineralogical composition of sandstone is important**

A proper matching of the properties of the replacement indent to the original stone will produce a more successful and long-lasting result than simply considering the surface colour without thinking about how the new stone will perform. Indenting with an unsuitable stone can only cause further damage and decay so the following aspects need to be considered:

- The function of the individual stone that may need to be replaced
- Is replacement stone available from an appropriate quarry
- How will the new stone affect the buildings, its function and appearance

Depending upon where the original quarry source was located, sandstones vary considerably in composition, colour, appearance and durability. These characteristics determine that different stones will perform in different ways. Understanding these natural differences is important when deciding upon which replacement stone should be used for the indents. Due to the limited number of stone quarries currently in production it is often difficult to find an exact match to carry out an indent repair. As the best match should be as

close as possible to the original stones geological composition, some technical advice should be obtained on what appropriate sources might still be available. (See contacts).

Where an exact match is not possible, the new stone should have the same surface colour and texture, and be slightly less resistant to the effects of weathering and decay when compared to the existing stone. Choosing the “wrong” type of replacement stone can have unfortunate and permanently disfiguring effects, especially if the sizing of the individual replacement blocks is also less than accurate. These differences can make the replacement block sit uneasily with the original; the surface can encourage local patches of biological growth to flourish; joint patterns can be disrupted, and the surrounding original masonry may be un-necessarily notched to accommodate the larger dimensions of the new blocks.



## How to carry out indent repairs

Scaffolding should be carefully designed and constructed to allow the work to be carried out safely, and be erected without damaging the existing masonry. The original construction needs to be studied and accurately measured to record the precise dimensions of any stone that needs to be replaced. This is necessary to ensure that the new stone fits exactly in the correct location and that the dimensions of the surrounding mortar joints do not alter in size. To assist in ensuring that the appearance of the indented stone visually “blends” more effectively into the building, details of the original surface tooling should also be noted. Particular attention needs to be paid to the angle of any chisel marks, the depth of the grooves, the size of any borders around the individual blocks, and the number of grooves that are incised into the face of the stone. Whilst failure to accurately replicate all of these features

on the replacement stone will produce an unsatisfactory result, it may be impossible to achieve the required effect if the “wrong” stone is chosen in the first place. When this happens it is likely to be due to the different (usually larger) size of sand grains in the original geological make up of the stone.

Care also needs to be exercised when cutting out the decayed stone to avoid chipping the edges of the remaining surrounding blocks. A sufficient depth of stone also needs to be removed to ensure that the new stone can sit securely once it has been inserted into the space previously occupied by the decayed piece.

As original ashlar build “stagger” the alignment of the vertical joints between the blocks in different courses, it is good practice to maintain this original pattern of building when indenting more than one stone. In doing so, the structural strength of the wall is maintained.





A reputable masonry contractor, with the relevant craft skills of sizing, cutting, tooling and setting the indent without damaging the surrounding masonry, should be employed to do the work. Taking care to replicate the dimensions of the surrounding joints and beds, the replacement blocks should be set in putty lime mortar, ensuring that any likely voids behind the indent are also firmly packed with mortar. In finally positioning the indent, the replacement block should be set so that the external face aligns evenly with the surrounding original face of the building. If wrongly positioned, the misalignment will look bad.

If properly chosen, newly indented stones will “weather down” from a raw, fresh, appearance in a reasonably short period of time to acquire a surface patina similar to the original. No attempt should be made to artificially weather or distress the finished surface of the replacement blocks.

Occasionally, only a partial indent of a damaged ashlar block will be required. This approach requires additional attention to detail so that the surface tooling and edge border detailing accurately matches the remaining tooling more closely. In addition, the joint between the two pieces should be cut as finely as possible to help the indent tie in better.







## Summary

- Retain as much original stonework of a building as possible
- An ashlar wall can withstand a considerable degree of erosion and distress before any indenting work is required
- Stones should only be replaced when they affect the structural stability and function of the surrounding stonework
- A proper matching of the properties of the replacement stone will produce a more successful and long-lasting result
- The original construction needs to be accurately studied and measured to record the precise dimensions of any stones that needs to be replaced.
- Failure to accurately replicate all the original surface features on the replacement stone will produce an unsatisfactory result.
- Care needs to be exercised when cutting out the decayed stone to avoid chipping the edges of the surrounding stones
- A reputable masonry contractor should be employed to do the work.
- No attempt should be made to artificially weather or distress the finished surface of the replacement blocks.

## Useful contacts:

**Historic Scotland**, Longmore House, Salisbury Place, Edinburgh, EH9 1SH:  
0131 668 8600 [www.historic-scotland.gov.uk](http://www.historic-scotland.gov.uk)

### Historic Scotland Historic Environment Grants Team:

0131 668 8801: Fax - 0131 668 8788 [hs.grants@scotland.gsi.gov.uk](mailto:hs.grants@scotland.gsi.gov.uk)

### Historic Scotland Inspectorate:

Listed buildings: 0131 668 8745: Fax - 0131 668 8722

[hs.listings@scotland.gsi.gov.uk](mailto:hs.listings@scotland.gsi.gov.uk)

Ancient monuments: 0131 668 8777: Fax - 0131 668 8765

[hs.ancientmonuments@scotland.gsi.gov.uk](mailto:hs.ancientmonuments@scotland.gsi.gov.uk)

### Scottish Stone Liaison Group

16 Rocks Road, Charlestown, Dunfermline KY11 3EN

### British Geological Survey

Murchison House, West Mains Road, Edinburgh EH9 3LA

## Further reading

- TAN 1 Preparation and Use of Lime Mortars, 2005, ISBN 1 903570 42 5
- TAN 12 Quarries of Scotland, 1997, ISBN 1 900168 47 2
- TAN 20 Corrosion in Masonry Clad Early Twentieth Century Steel Framed Buildings, 2000, ISBN 1 900168 52 9
- TAN 25 Maintenance and Repair of Cleaned Stone Buildings, 2003, ISBN 1 903570 80 8
- The Performance of Replacement Sandstone in the New Town of Edinburgh, 2000, ISBN 1 903570 09 3
- Stonecleaning – A Guide for Practitioners, 1994, ISBN 0 7480 0874 8
- The Repair of Historic Buildings in Scotland, 1995, ISBN 0 951 7989 2 8
- Memorandum of Guidance on Listed Buildings and Conservation Areas, 1998,  
Visit: <http://www.historic-scotland.gov.uk/memorandumofguidance>
- Scotland's Listed Buildings: A Guide to Owners and Occupiers  
Visit: <http://www.historic-scotland.gov.uk/re-freepublications.htm>



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