

COTSWOLD STONE SLATE ROOFING

Technical guidance for owners and occupiers



This is a guide to one of the most characteristic materials traditionally used in Cotswold architecture.

Many listed buildings have stone slate roofing which, from time to time, will require maintenance, repair or replacement. Where extensions to these buildings are permitted, stone slate roofing will often be a requirement.

This guide will help building owners or their professional advisers to make informed decisions on stone slate roofing, leading to the better preservation of the buildings, and this very special Cotswold craft.



Cotswold District Council

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CARING FOR THE COTSWOLDS

Introduction

Natural stone roofing provides much of the special character of many parts of the country, and this is especially so in the Cotswold Hills. Although, elsewhere in the country, many local traditions have been lost, in the Cotswolds this has not been the case. Stone slate roofing can still be found throughout the region, from Chipping Campden in the north, to near Bath in the south.

The Cotswolds is an area of homogeneous architecture, always reflecting the changing colour and texture of the underlying stone, and is an area where stone slate roofing is second only in importance, as a building material, to stone walling. However, this long-established situation could be under threat unless the production of stone slates, and the craft of laying them, is studied and revived. Even the name seems to be disputed: it is obviously not a metamorphic slate (such as Welsh slate) and yet not a tile, in the sense of a moulded object. The term stone tile tends to be used in the south of the District, and stone slate in the north.

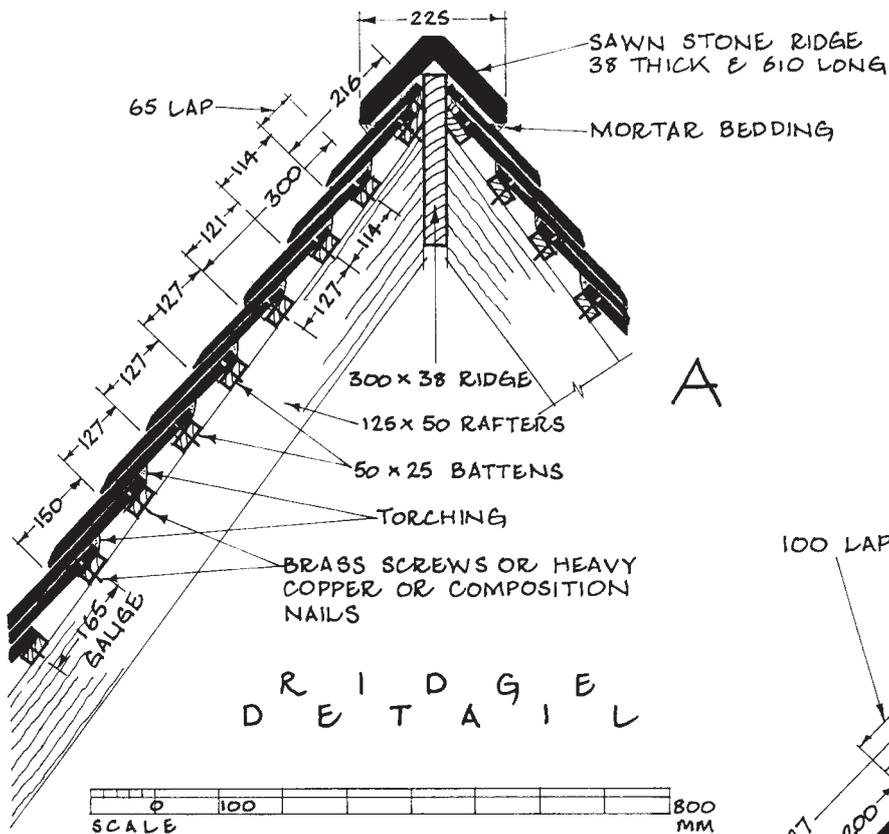
Types of Cotswold Stone Slate

There are, geologically, two stones from which Cotswold stone slates are made, both of which are oolitic limestones: 'Forest Marble' and 'Stonesfield Slate'. The methods of producing slates from these stones are quite different, making the most of their individual properties.

Forest Marble is split by hand very shortly after being extracted from near the surface of the ground, usually at a small quarry. At one Cotswold quarry where slates were, until very recently, made by this method, it was thought that they should only be split within a few days of being extracted, while they still retained their natural moisture, or 'quarry sap'. Such stone slates are called 'presents'. This is the oldest method of producing Cotswold slates, probably dating from the Roman period.



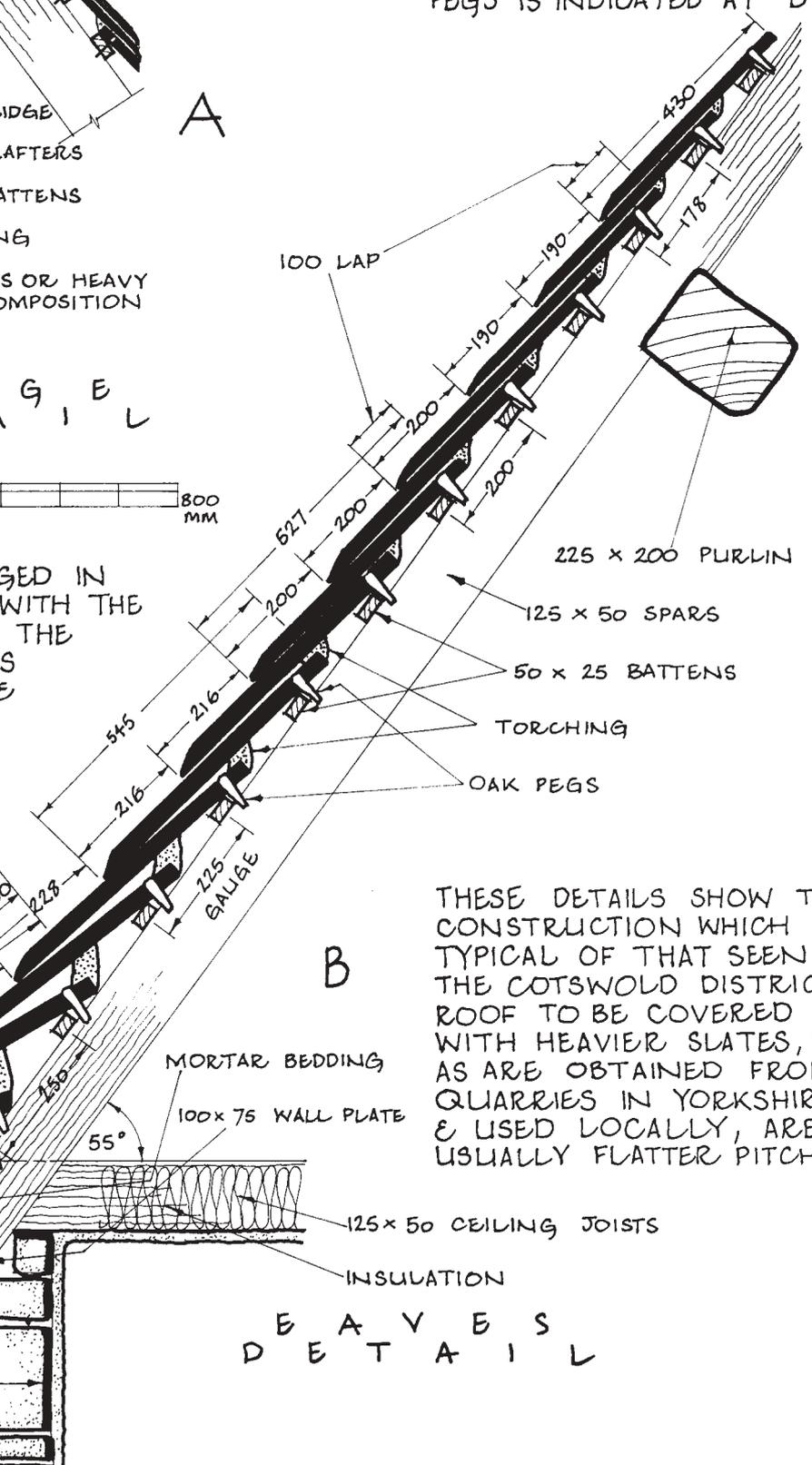
This view of the roofs of Arlington Row in Bibury illustrates many of the craft techniques that form part of the Cotswold stone slate roofing tradition, which this guide describes.



NOTE THE ALTERNATIVE METHODS OF SECURING THE SLATES. THOSE AT "A" ARE SHOWN FIXED BY NAILS OR SCREWS & THE TRADITIONAL METHOD OF HANGING THEM WITH OAK PEGS IS INDICATED AT "B".

R I D G E
D E T A I L

THE SLATES ARE ARRANGED IN DIMINISHING COURSES WITH THE LARGEST & THICKEST AT THE BOTTOM. THUS, IN THIS EXAMPLE, THE EAVES & RIDGE SLATES ARE APPROX. 584 & 216 LONG, 38 & 12 THICK. WITH GAUGE VARYING FROM 250 TO 115 RESPECTIVELY.



THESE DETAILS SHOW THE CONSTRUCTION WHICH IS TYPICAL OF THAT SEEN IN THE COTSWOLD DISTRICT. ROOF TO BE COVERED WITH HEAVIER SLATES, SUCH AS ARE OBTAINED FROM QUARRIES IN YORKSHIRE & USED LOCALLY, ARE USUALLY FLATTER PITCHED.

E A V E S
D E T A I L

This technical drawing shows the key stone slate roof construction details, especially the eaves and ridge, and the use of diminishing courses.

Stonesfield Slate is the name generally given to frost-split stone slates, originally produced near the village of Stonesfield in West Oxfordshire. Because of its depth in the ground, the method of extraction of the slate was quite different to 'presents'. The stone in rough block form called 'pendle' was hoisted to the surface from stone mines, and put out in nearby fields to become 'frosted'. As the frost gradually split the stone along the thin natural bedding planes, these being a consequence of the geological formation of the material, slaters would work to assist the splitting process. The resulting slate was much thinner and more regular than the rougher 'presents', and was highly prized for the most prestigious roofs, such as those of Oxford colleges. The thinner slates also afforded an opportunity for some sophistication, such as an angled dressing of the sides to provide a very slight overlap when they were laid.

Slate Sizes

The first and most obvious feature about Cotswold stone slates is that, as a material produced from fissile sedimentary rock, it is impossible to supply them in consistent sizes, as with Welsh slate, a metamorphic rock. The stone breaks naturally to provide far more smaller-sized slates than large ones so, over the years, a logical way of taking advantage of this geological accident has evolved.

One of the main functions of a stone roof is to throw water well clear of the wall. Before the introduction of gutters it was even more important to project the eaves as much as possible. So the largest slates (normally about 600 mm long, but some up to 750 mm long) were fixed here in a double eaves course. These slates were given a special name 'cussoms', the next course being called 'followers'. The smallest-sized slates (called 'short cocks') were the most common, available in large numbers and used at the highest part of the roof slope. They were only 150 mm long.

ENGLISH HERITAGE POLICY ON SOURCING STONE SLATES

- Wherever possible, new stone slates rather than second-hand should be used.
- Reclaimed slates should be used only on the building or group of buildings from which they were removed.
- Substitute materials, such as artificial slates made of fibre resin, concrete tiles, 'reconstituted stone' and so on, are inappropriate alternatives to real stone slates and are not suitable for use on historic buildings.
- New stone slates should match the existing ones as closely as possible in terms of geological type, colour, texture, size, and thickness. It is important to recognise the slates particular to your area. Sandstone and limestone slates should never be substituted for each other, nor should they be used together.
- Stone slates which have been sawn to thickness, rather than split, can be technically and aesthetically unacceptable and, if they fail to meet these criteria, should not be used on historic buildings.

EXTRACT FROM COTSWOLD DISTRICT LOCAL PLAN POLICY 27 I(e) - APPLICATIONS FOR DEVELOPMENT WHICH AFFECTS A LISTED BUILDING OR ITS SETTING

Proposals will not be permitted for the removal of natural roofing materials from the roof slopes of a listed building, and their replacement with alternative modern materials if it would have a significant adverse affect on its architectural or historic interest, character or setting, unless justified in order to secure the productive use of the building.

Note: Applications seeking the replacement of natural materials with modern alternatives may need to be accompanied by appropriate information, such as a business plan, justifying that the proposal is necessary to secure the productive use of the building.

Method of Fixing

Fixing of slates was achieved by one, or sometimes two, wooden pegs driven through a hole near the top of the slate. In the past, this hole was originally made by the slater finding, by feeling with his fingers, a thinner point in the slate and carefully, with a pointed hammer, breaking through to form an hour-glass shaped hole. Today, drills are used. Usually oak was cleft to form a peg and this was driven into the hole until it was firm, the pegged slates then being hung over the batten. Ridges were always made from a simple angled section of dressed stone. Sometimes, on the more elaborate buildings, mostly churches, a roll-topped stone ridge was used.

Stone slate roofs are very heavy (about 1000 kg per 10 sq m) and an effect of this weight is often a slight bend in the roof. However, this causes the slates to pack more closely together, and it is now thought that roofs were made deliberately to allow this bow, keeping out the rain and snow much more effectively.

Swept Valleys

On the whole, Cotswold roofs are as simple in form as possible. The most elementary type is a straight pitched roof, usually at 47° to 55° , spanning between two gable ends. However, where a more complex roof was required, with gables on side elevations, there was a need to turn it through 90° on plan, and this resulted in the development of the 'swept valley', the construction of which is often the best example of the slater's art.

At the valley, specially cut slates would be used, designed to form a gentle curve to the roof. Some 'swept valleys' were laid to a tighter pattern, with slates laid two-across the valley alternating with three-across. Where there were three, the central slate was wedge-shaped and did not require a peg. Called a 'bottomer' it was held in place by the two slates called 'lie-byes' or 'side skews' alongside it. The next course had to break joint, so there were two slates turning the valley, these being called 'skews'.



A fine swept valley on a newly-laid roof in Chipping Campden. This detail requires the most skilled craftsmanship in its construction, involving the careful shaping and fixing of the wedge shaped slates in the valley. Often, modern roofers omit this and insert a close-mitred or open lead valley. Although both of these are cheaper to construct, neither appear as satisfactory as the traditional valley and are best avoided.

Conservation and Replacement

There are many stories about the durability of Cotswold stone roofs, and recent concerns over the quality of the 'presents' now quarried, and their resistance to frost attack, the principal agent of decay in stone roofs. Historically, Cotswold roofs were well maintained, and kept free of moisture holding moss. Scraping roofs was a common maintenance task, although now it is mostly discontinued, partly on the grounds of expense. This is a false economy - many roofs now needing near to total replacement, where very few new slates would have been required if scraping had been carried out. If a stone roof was scraped once a year it could last twice as long. Many roofs being replaced on the oldest Cotswold buildings are thought to be original. So, with regular maintenance, a Cotswold roof can easily last 100 years, and could last as long as 200 or 300 years.

Where stone slates have decayed, the question of replacement arises. A common situation is to find that about 50% of the slates have perished, so new material has to be imported. While second-hand slate is commonly used, this practice has resulted in the stripping of many other old buildings, cannibalising their slates for the refurbishment market. Recently, serious attempts have been made to discourage this process, and promote the use of new stone slates. Not only does such an approach save many old buildings from having their roofs pillaged for supplies (occasionally through theft), but promotes the development of stone slate production.

Until recently, there were only two quarries in the Cotswolds producing stone slates. Today, the situation is greatly improved with five Cotswold quarries currently in production.

There are strong traditions for limestone slate roofing in France, and with their investment in mechanized quarrying (reducing the price of the product) it is not a surprise to find French stone imported. A French slate is imported in block form from the Cote d'Or, in Burgundy, where stone slating is part of the local tradition, and where there can be hard frosts. The colour of the slate is more orange-yellow, and they have hand-dressed edges. These have been very successfully used on a number of important roofing projects in the Cotswolds.

Some Definitions

Bedding planes: The naturally formed splits in the rock, which in the case of slate material, are close together.

Fissile: Easily split (along the bedding planes).

Metamorphic rock: Rock that has been formed from the action of heat or pressure when that material was deep in the earth.

Sedimentary rock: Rock, such as Cotswold limestone, that has been formed by the accumulation of sediment, usually on the floor of former oceans.

Three technical papers will be published to accompany this guide. The first will provide a 'model' specification for stone slate roofing. It is being developed during the course of research and conservation work at Woodchester Mansion, near Stroud. The second will provide a list of suppliers of stone slates and the third a list of roofers known to have produced good work.

Credits:

Photographs and illustrations: English Heritage, Mike Hill and Steve Edwards.

Further Reading:

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For further advice and information contact:

The Countryside and Conservation Section
Directorate of Development and Heritage
Cotswold District Council
Trinity Road
Cirencester
Gloucestershire
GL7 1PX

Tel: 01285 643643 Fax: 01285 644561

