

Building stones of Edinburgh: use and availability of sandstones

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The use and availability of sandstone in Edinburgh

"Ideal stone is durable, strong and of a colour which would best bring out the architectural features of his [the architect's] design, and harmonise with the locality and surroundings"
- James Gowans, 1883

The buildings of Edinburgh provide an open-air museum of quarry products, walling methods and stone finishes. Examples of the use of sandstone from famous quarries, many long since abandoned and filled in, can be observed. The weathering characteristics of stones subjected to many years of exposure to the atmosphere of 'Auld Reekie', can be compared and contrasted. Although exotic stone of igneous and metamorphic origin from all over the world can be observed as cladding or 'geological wallpaper' on shop fronts, the emphasis in this account is placed on sandstone, both its traditional, structural uses and as cladding.

Methods of walling



Telfer Wall, the Vennel, Lauriston Place. An extension of Flodden Wall to incorporate George Heriot's Hospital. Rubble construction mainly of local sandstones. Built 1628-1636.

Sandstone has been built into structures in a variety of ways. When stones have little or no work done on them after they come from the quarry, they are described as rubble. The broken pieces of stone, often of varying shape and size may be built as random rubble walls as in the Flodden Wall at the **Vennel** [32]. Early tenements were also rubble-built and **No. 7 West Nicolson Street** is a fine late 18th century example. An example of a modern rubble wall may be seen on the south side of Holyrood Park Road near the **Commonwealth Pool**. Rubble walls are relatively cheap to construct and may be built either uncoursed or in courses. Stones are taken more or less at random and built to form the strongest bonds across and vertically in the wall with no attempt to form accurate vertical or horizontal joints. Large stones are flat bedded and packed or wedged up with smaller stones. Joints are well filled with mortar and where these joints on the face are large they are packed with small stones driven into the gaps. The strength in these walls depends largely on the mortar.



No. 21 George Square (west side), Edinburgh. Pink Craigmillar sandstone with cherrycock pointing and black dolerite snecks. Built in 1767-1774.

Where stone can be quarried from thin beds in the quarry or where thick beds are easily split into smaller pieces the rubble can often be readily cut into squares. Such squared rubble, also known as square-snecked rubble, can then be built into uncoursed walls in irregular patterns involving units of four stones (a large stone known as a riser or jumper, two thinner stones called levellers and a

smaller stone, a check or sneck). When the rubble is levelled up to form courses 300-450mm (12-18 inches) deep coursed squared rubble is produced (Figures 6.1c-d). The squared rubble can be brought to courses of varying depths with some of the stones at course height and smaller stones tilling in the spaces. Figure 6.1d shows a good example of snecked squared rubble at **Marischal Place**, Blackhall. In regularly coursed squared rubble the courses are again of varying height but the stones in any one course are all of the same height. A decorative variation of this style of walling is seen in some of the surviving buildings on the west side of **George Square** [43] where some wider vertical joints have a series of black dolerite snecks in them.

Rubble walls were often left as bare stone, for example in Old Town tenements, but sometimes they received a dash of aggregate bound together with a lime binding agent (harling) or a smooth floated mortar finish (rendering) as can be seen on the north-west side of **St Andrew Square**.



North side of Charlotte Square

Many buildings in Edinburgh's New Town were built of ashlar, sandstone blocks accurately dressed to given dimensions. The thickness of the joints between these stones is often as little as 3mm (2/16") between courses 250-360mm (10-14 inches) high. Ashlar is generally built like regular coursed rubble. Ashlar is the most expensive and best type of masonry. Often in Edinburgh, to reduce the cost, outside walls were faced with ashlar (fixed to cheaper material, usually rubble, by bonding stones) on streets or front elevations.

The ground floors of many buildings in Edinburgh's New Town are emphasised by the use of rusticated ashlar in which the margins of the stones are chamfered to form V-shaped channels along the joints, as on the north side of **Charlotte Square** [91] (Figure 6.1g-h). Alternatively ashlar edges are sunk to form channelled or rectangular joints. The latter are seen on the lower part of the **High Court of Justiciary** [14], Bank Street.

Surface finishes

Smoothed ashlar

Ashlar blocks are worked on the exposed surface to produce a variety of surface finishes. A smoothed or polished face was produced by working the stone with a 50mm (2 inches) wide chisel (a boaster) to a regular surface then rubbing it with a carborundum, sand and water mixture till smooth. This process used to be done by hand and was very expensive but the use of mechanical 'rubbing beds' has made the production of this kind of surface finish much cheaper.' An Edinburgh building firm, Watherstone's was one of the first to use machinery for smoothing. James Gowans, the Edinburgh quarrymaster and builder advocated the use of polished ashlar: 'Polishing removes the bruised material, and presents to wasting agents a surface more likely to prevent decay than any other kind of work'.

Droved (boasted) work

This type of finish is very common in Edinburgh where the flat surface has been worked over with a 50mm (2 inches) chisel to give a series of 40-50mm wide bands of parallel tool marks over the surface. These can run horizontally, vertically or diagonally across the face.

Tooled work

When the boasted surface is further worked with an even broader chisel, 100mm (4 inches) wide, so that it is covered with continuous parallel horizontal, vertical or diagonal fine lines the finish is described as tooled. The spacing between the lines depends on the hardness of the stone.

Stugged (punched) work

Here the stone is worked over with a pointed chisel (punch). Often a droved margin is worked around this stone. With finer pits the surface is known as jabbed or picked. An example of coarse stugged work on squared rubble is illustrated.

Broached work

Where the surface is worked with a narrow chisel (gouge) or a toothed chisel to form a series of horizontal or vertical furrows the result is broached work. Usually these stones have chisel drafted margins.



The Bank of Scotland on the Mound.
Vermiculated work can be seen in bands at the base of the photo.

Rock-faced (bull-faced, pitch-faced, rusticated) work

As the name suggests this is an attempt to reproduce the natural rock surface by producing a central rough raised area with a marginal draft. Rock-face finishes are often seen in the basements of New Town buildings, for example in **Charlotte Square** and **Heriot Row**, with polished ashlar at higher elevations.

Vermiculated work

This finish produces a continuous winding pattern slightly raised above the inner area of the stone. An example can be seen on the south side of the **Bank of Scotland** [13] on the Mound.

Cladding

Sandstone is still used in building today as cladding to steel-framed buildings to give the appearance

of traditional stonework. This stone is usually prepared at a factory where the sandstone is machine cut and dressed prior to delivery to the building site. There, the main work consists in fixing the prepared stone to the building. Since the Second World War the stone veneer on modern buildings has been made thinner so that it is now often no more than 100 mm thick. Thinner and lighter skins require very good anchorage to the building where in the past the mass of the stone helped to keep the cladding in place. Modern cladding is thus held on by large numbers of non-ferrous fixings including ties, clamps and dowels of copper, phosphor-bronze or stainless steel.

Use of different stone in the same building

Commonly stones of different character and from different sources are used in the same building. The **Meadows Pillars and Sundial** [158] are probably the most extreme examples in Edinburgh. They were erected in 1886 by James Gowans to commemorate the International Exhibition, possibly to serve as an indication of the weathering properties of a range of stones which were being 'imported' to the city. A wide range of stones from Scotland and England and several types of stone finish can be seen. The only local examples are blocks from Hades and Redhall quarries. Unfortunately the pillars have since been moved and re-erected, so that the original structure and the order in which the stones were placed has been changed. They may now be seen at the west end of Melville Drive, south of Tollcross, at the entrance to West Meadow Park.

In these monuments, amongst stones from further afield, there are blocks of Dundee Formation sandstone from Myreton and Leoch quarries, near Dundee, Cementstone Group sandstone from Whitsome Newton, Berwickshire, Lower Limestone Group sandstone from Woodburn and Parkhead, Northumberland and Middle Limestone Group sandstone from Cocklaw, Northumberland. Most of these, said to be weathering in 1893, have not weathered much more since then. On the Sundial the Whitsome Newton stone is scaling and cracking slightly but much of the detail of the lettering and coats of arms on the Permian red sandstone from Ballochmyle near Mauchline, Ayrshire has been lost. In the Pillars the younger Permo-Triassic sandstones have generally not stood so well as those of the Lower Carboniferous. However the fact that stones of different hardness and grain-size have been placed together in the Pillars may account for some of the differential weathering observed. Equally, weathering effects in adjacent stones of different composition may have been increased by chemical run-off over the years.

The use of red and pale brown, yellow or grey sandstones in the same building is commonly seen throughout the city, particularly in houses and villas built during the last 100 years in the outer districts. Generally the Penman red sandstones provided cut blocks for use as smoothed ashlar quoins and jambs with the paler coloured Carboniferous stones used in wall courses in a range of finishes.

Availability of stone: an historical perspective

At the height of the building boom in the early 19th century, Edinburgh's quarries could not keep up with the demand for sandstone so that the builders had to turn to nearby areas outside the city. In fact, this was not a new practice as stone had been shipped over from the Fife ports of Culross during the early 16th century and Burntisland in the late 18th century. The introduction of new forms of transport, including firstly canal routes and later the railways, made it easier to bring stone from further afield.

The first large supplies of stone came from the West Lothian quarries of Humbie and Binny which were located near to the Union Canal (opened in 1822). The canal trade declined with the growth of the railway network from 1842 onwards. More quarries were brought into use by Edinburgh builders exploiting the new railways. The cream and white stones of Polmaise, Plean and Dunmore

came from the west. The deep red stone from the ancient quarries of Corncockle, Locharbriggs, Gatelawbridge, Moat and Corsehill was transported on the Caledonian Railway from the south-west. The completion of the Forth Railway Bridge in 1890 made it easier to bring the white and yellow Fife sandstones (from Grange and Fordell) into Edinburgh, although the old Cullalo and Longannet quarries had been supplying stone for many decades. However, as demand for sandstone decreased, the Scottish quarries faced competition from the large quarries in northern England, in particular Prudham, Gunnerton, Doddington and Cragg, all of which supplied stone to Edinburgh in the closing years of the 19th century.

Probably the inherent conservatism in stone working methods which had remained essentially the same for hundreds of years contributed to the decline in the use of stone. Cheaply produced brick and artificial stone slowly began to replace sandstone before the First World War. More rapid house building led to the replacement of sandstone by brick, firstly for party walls, then for the backs, sides and chimneys of houses. Latterly it was only ground floor fronts, and last of all, dressings for windows and doors which used natural stone. By the late 1930s even dressings were being made from artificial stone.

The decline in demand for building stone was a self-perpetuating process. Throughout the 1920s and 1930s lessening demand meant that fewer men were employed and thus the body of the workforce, with hard-won experience required to work stone, diminished at a steadily increasing rate. Falling or fluctuating output led to uneconomic use of quarry plant and labour. The last straw was probably the outbreak of the Second World War when men left the industry which was not protected from the effects of conscription into the armed forces." Many quarries which closed then have never reopened.

When the post-war rebuilding programme began in 1945 the shortage of stone workers was offset to some extent by increased mechanisation in stone handling. Nevertheless, by 1949 it was estimated that surviving Scottish quarries were producing less than a quarter of the output needed to minimise costs.' The need for a quick, cheap, craft-free building programme contributed to a change of attitude towards what was expected of the building industry. As a result, the use of natural stone declined to such an extent that by 1950 only eight sandstone quarries were being worked in Scotland.' Although sandstone continued to be used for fronts of buildings or as a facing stone, it was the Northumberland quarries at Blaxter and Darney which became the important sources of supply in the post-war years.

From the early 1970s government and private owners have shown a renewed interest in the use of sandstone for the restoration of historic buildings and the cladding of new buildings. As a result, particularly for restoration purposes, matching natural stone has had to be found either from currently working quarries or from buildings which have been demolished in recent years. Ten years ago according to Elaine Leary, Bob Heath (pers.comm.) and BGS sources, up to eleven sandstone quarries were working in Scotland, namely Clashach, Corncockle, Corsehill, Cutties Hillock, new Dunmore, Greenbrae, Locharbriggs, Newbigging, Rosebrae, Spittal (for flagstone) and Spynie. Some of these were worked intermittently to meet the demand for specific building projects. Several of these together with quarries operating in northern England, including Catcastle, Dunhouse, Springwell, Stainton, Stanton Moor, Stoke Hall, Wellfield and Woodkirk, have supplied the city in recent years. Today, a similar number is operational **[Insert Link]**, demonstrating there is a continuing demand for top quality stone. Snatch quarrying in which stone is extracted from temporary excavations, for use in new build or for repair work, has become a practical method. Thus the temporary excavation in September 1997 near the former Binny Quarry, West Lothian (Harry Turnbull, Stirling Stone Group, pers. comm.) has supplied sufficient material for repairs to the **Scott Monument** [3], Princes Street.

In Edinburgh the local sandstone quarrying industry is extinct. However, the need for restoration of the city's priceless architectural heritage means that there will always be a market, as long as the resource from farther afield is available. In turn, the continuing demand for sandstone should ensure that the skills required to quarry and work the stone will not be lost. In Scotland generally, the building stone industry is showing signs of revival and the environmental benefits and low consumption of production energy may encourage even greater use of the resource in the 21st century.

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