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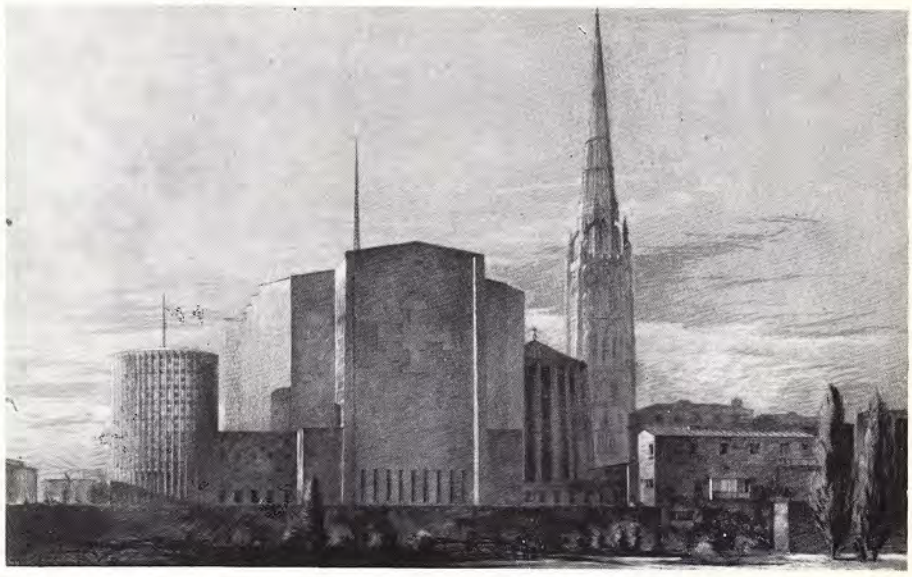
information on current stone practice. No.3: January, 1955

Sandstone for character and colour

Sandstone varies in colour from dull crimson, pastel pink, and pale buff, to greenish-brown and blue-grey. It is the charm of these colours, combined with its strength and durability, that has made sandstone so popular a building material.



THE ARCHITECT'S DRAWING OF COVENTRY CATHEDRAL

FORMED of grains of sand cemented together, sandstones derive their colours from certain minerals in the grains, or from the cementing substances such as silica, calcite, iron oxide or clay. The sand is mainly quartz, but may also include mica and felspar. Generally speaking, the harder and more durable types of sandstone come from the older geological formations, and those suitable for building purposes may usefully be classified into three groups: red sandstone, millstone grits and coal measures.

One of the best known red sandstones is Hollington Stone, quarried in Staffordshire. Its beauty of texture can be seen to advantage in Hereford Cathedral. Of the Triassic system—like Hollington—are the crimson Woolton and Rainhill stones of Lancashire. Other red sandstones are Red Wilderness, quarried in Gloucestershire; Corsehill from Scotland; and Red Mansfield, which is found in Nottinghamshire and was used by Sir Gilbert Scott in St. Pancras Station. From the same geological group comes the fine-grained Blue Liver Stone from Angus. It was used for the piers of the Forth Bridge. In Scotland, there can hardly be a town south of Aberdeenshire that has not got some outstanding building in "Freestone", while Edinburgh and Glasgow are built almost entirely of it. Crushing-strengths of the red sandstones vary between 550 and 700 tons a square foot.

Millstone grit sandstones are found in strata running from Derbyshire through Yorkshire to Northumberland, and vary in colour from pale-grey to pale-brown. These are durable stones with a fairly fine grain and crushing-strengths up to 675 tons a square foot. Examples are: Darley Dale stone found in Derbyshire; Bramley Fall in Yorkshire; and Dunhouse stone from Durham.

Sandstone from the coal measures is found chiefly in Yorkshire—under the generic name of York stone—and Gloucestershire. The hard York stones have been used for many public buildings in the North, including Huddersfield Town Hall and the Manchester Exchange. Forest of Dean stone, grey or grey-blue, is very hard, and among its many uses in the West of England is that to be seen at Avonmouth Docks.

Whenever buildings have been designed to survive as memorials of their time, stone has often been chosen as the most fitting material for their construction. It is significant that in the plans of the most controversial and forward-looking public building of recent years—Coventry Cathedral—Mr. Basil Spence has chosen Red Hollington for the entire building. Sir Giles Gilbert Scott designed his Liverpool Cathedral to be built of red sandstone—Rainhill being used in the interior, and the slightly harder Woolton for the exterior. An interesting revival of the large-scale use of indigenous materials is exemplified in the Scottish Hydro-electric Scheme, many of the buildings being built of local sandstone.

To the natural dignity, and harmony with its surrounding, of all building stone, sandstone adds the special charm of its pleasing colour.

FACADE OF IVY BANK SCHOOL, HUDDERSFIELD, INCORPORATES CROSLAND HILL STONE

Location of principal quarries throughout England, Scotland & Wales

3 Hollington Stone

SOURCE Tean, Stoke-on-Trent, Staffordshire.

GEOLOGICAL Micaceous Sandstone, Triassic System (approximate age 170 million years).

COLOUR White—varies from white to a pale salmon-pink according to bed.
Red—varies from pinky grey to red according to bed.
Mottled—a combination of Red and Creamy White.

CHARACTERISTICS All three varieties are fine-to-medium grained. The stone hardens on drying out and exposure. Free working and will take and keep a sharp arris.
Suitable for internal and external work.

AVAILABILITY The White and Red varieties can be supplied to suit demands. The mottled stone is limited.

SIZES Up to 3 ft. high in bed. Length and breadth to suit requirements. Maximum weight of blocks 5 tons.

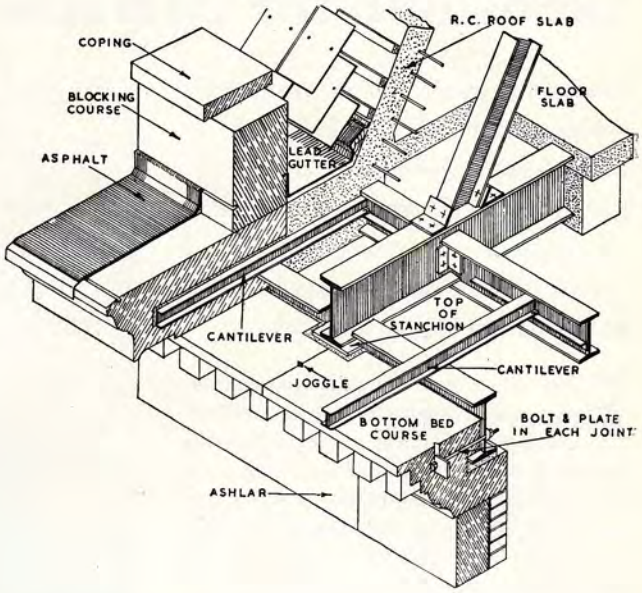
FINISH Sawn, tooled or rubbed.

PHYSICAL PROPERTIES Density 138 lb. per cu. ft.
Porosity 11%
Failing stress 289 tons per sq. ft.

WHERE USED Hollington stone has been used extensively for church reconstruction, school, factory and office buildings.

Stonework in steel-framed structures

TYPICAL CORNICE AND PARAPET SUPPORTED BY CANTILEVERS AND BOLTS AND PLATES



THE TECHNIQUE OF DESIGNING AND FIXING stonework in steel-framed structures is now common practice, and presents few difficulties. Normally, it is possible to arrange adequate bonding between stone facings and brick backing to piers and walls, thus eliminating the need for metal cramps and ties. In the case of horizontal courses at floor levels, such as heads, string courses, cornices, etc., it is usually necessary to design special fixings for supporting or tying back the stonework, as it is not always possible to 'tail down' or to get support on the beams. These fixings take the form of cramps or bolts and plates or cantilevers, and their precise design and detail will depend on both the architectural treatment and the design of the steel work. The sketch shows a typical cornice and parapet supported by cantilevers and bolts and plates.

Where stonework is fixed to beams of large span, a fairly wide joint should be allowed, to prevent fracture of the stone in the event of deflection of the beam. In such cases it is preferable to delay final pointing of the masonry joints until after the beam has been fully loaded.

Generally speaking, with a steel-framed structure each floor should be self-supporting—which means that the stonework of each floor should be carried by the steelwork at floor levels, and no weight allowed to pass to the wall below.

It is important that all voids and crevices between the stones and the steelwork should be well filled. Fine-mesh concrete in Portland cement is recommended. This will ensure preservation of the steel by preventing oxidization, and will lessen the risk of the stones becoming stained by rust. The backs of stonework should be treated with limewash or a reliable bitumastic compound. Notes on the prevention of staining will be given in a future leaflet.

From the Masonry Contractor's point of view, it is important that full steelwork details are available at the same time as the architect's details. At the setting-out stage, the design of the steelwork may suggest alternative methods of jointing and bedding; and as the necessary notching to the backs of stone entails considerable labour, this should always be done as the work passes through the various production phases where machinery can be used to the best advantage. Notching on site should be avoided—it is costly and causes delays.

ADVISORY SERVICE

The British Stone Federation has made a close study of all the problems relating to the use of stone, and has set up an advisory panel, which is freely at the service of architects and others, to give advice and help on stone matters. Inquiries should be addressed to the Secretary, The British Stone Federation, 70 Victoria Street, S.W.1.

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