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STONE

information on current stone practice. No. 9: May, 1956

Uses of stone in bridge-building

WATERLOO BRIDGE, OPENED IN 1944

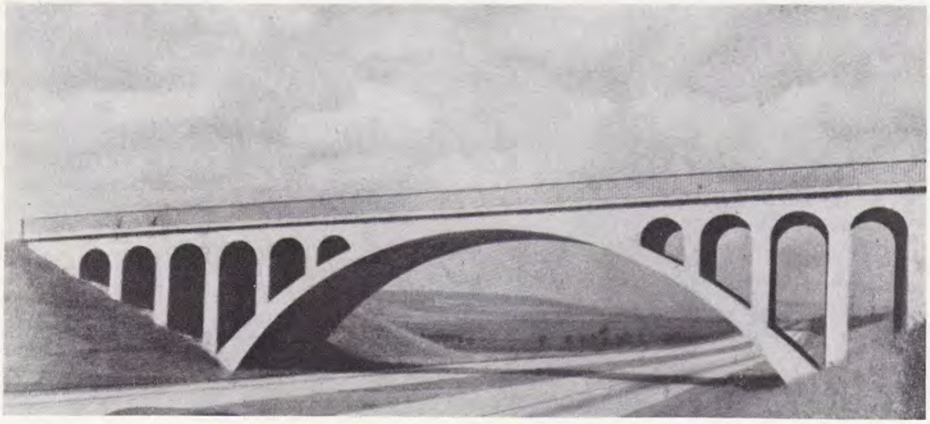
A TYPICAL EXAMPLE OF THE LOCAL USE OF STONE, THIS BRIDGE ON THE LOSTWITHIEL BY-PASS, COMPLETED IN 1945, WAS CONSTRUCTED MAINLY OF RANDOM RUBBLE WALLING IN CORNISH GRANITE.

BRIDGES of a minor character, including footbridges, are still being constructed of solid masonry. But the use of stone for large bridges is now limited almost exclusively to piers, cutwaters, and abutments, and to the facing of concrete structures.

Stone has, in many ways, determined the aesthetics of modern bridge designs. The finest contemporary British bridge, Waterloo Bridge, for instance, makes extensive use of stone. The five 240 ft. spans of reinforced concrete are faced with Portland stone slabs laid in vertical courses. Incidentally, it is interesting to note that the piers were made of Devon and Cornish granite taken from the original Waterloo Bridge, designed by Sir John Rennie in 1817, and redressed—a tribute to the lasting quality of granite.

KING GEORGE V BRIDGE, ABERDEEN

Other typical examples of modern bridges in which stone has been used are: Lambeth Bridge, for the piers, cutwaters, and pylons of which Sir George Humphreys used dressed granite; Gateshead Bridge, at Newcastle-on-Tyne, whose abutments in Cornish granite are an impressive feature; and King George V Bridge, Aberdeen, completed in 1941, which is faced with Kemnay granite. A current example of the intelligent use of local materials is the bridge now being built over the Severn at Maisemore, near Gloucester, which is to be of reinforced concrete with facings of Cotswold stone.



AN OVERPASS NEAR EISENBERG, GERMANY. BUILT IN 1937, FOR THE REICHSAUTOBAHN, THIS IS ONE OF THE MOST HANDSOME OF RECENT STONE BRIDGES.

A notable exception to the use of stone purely as cladding, is to be found in pre-war Germany, where, because of the shortage of steel, a number of stone-built bridges were incorporated in the newly-planned trunk roads. These bridges reached a high standard of craftsmanship.

Bridges are usually intended to last a very long time; many are centuries-old; and although a bridge is essentially functional, its appearance is of prime importance in relation to the local surroundings. There is no doubt that stone is the best facing material for attaining that harmony.

Location of principal quarries throughout England, Scotland & Wales

9 Clipsham Stone

SOURCE Clipsham, Rutland.

GEOLOGY Lincolnshire Limestone (Jurassic System).

COLOUR Pale cream and buff. Some beds have blue-grey patches.

CHARACTERISTICS Medium grain. Somewhat oolite, and in the clastic are a large number of shell fragments. Throughout the whole mass of stone are a large number of plates of calcite, which give it a peculiar glistening appearance. The shell fragments contain portions of ecrinites and echinoderms. Scattered in the mass of stone are some glistening crystals of calcite, and the whole of the clastic is bound together by a matrix of the same material. On the faced surface of this stone many of the fragmentary particles appear rather greyish and opaque. Clipsham will take and keep a sharp arris, and is suitable for all classes of plain and moulded work, as well as for carving and monumental purposes.

AVAILABILITY Up to 60,000 cubic feet yearly.

SIZES Up to five feet on the bed. Length and breadth to suit requirements.

FINISH Sawn, tooled, or rubbed.

PHYSICAL PROPERTIES Density 150 lb. per cu. ft. Failing stress 291.6 tons per sq. ft.

WHERE USED Clipsham stone was used in building the new House of Commons, and for all the restoration work on the Houses of Parliament in the last 20 years, also for work now in progress on Big Ben. Other buildings: Buckingham Palace, Hampton Court, and York Minster, the Cathedrals of Canterbury, Salisbury, Ripon, and Peterborough, and most of the Oxford Colleges for the past 70 years. Buildings now being erected at Oxford are: Nuffield College and the Inorganic Laboratory. This stone is being used for church restoration throughout the country.

CONSTRUCTION NOTES

Construction of fascia course

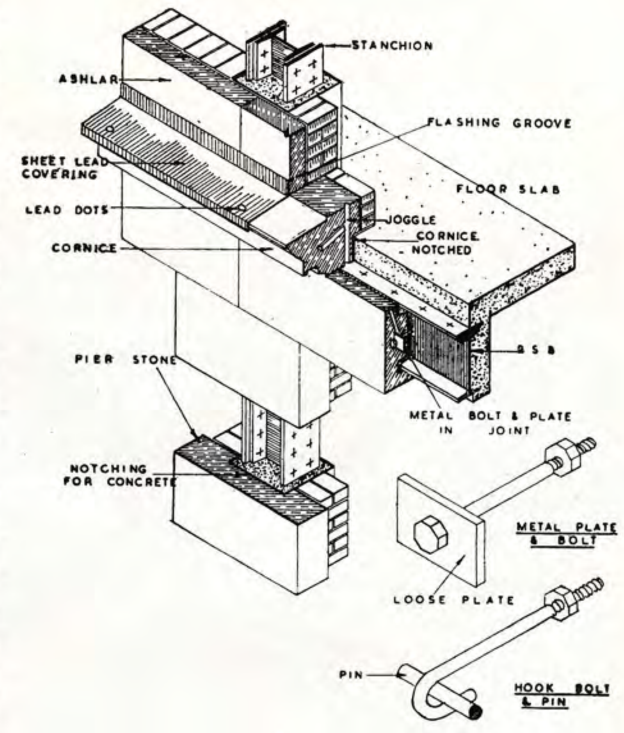
THE COVERING OR FACING OF framed structures with stonework often entails a good deal of labour in notching or cutting the back surfaces of the stones in order that they may fit the contour of the structural members. This labour is expensive and often wasteful. By careful consideration of requirements, thickness of facing material could be reduced without lessening the stability and effectiveness of facings. Also, large quantities of facing material can be saved by careful arrangement of the bonding.

When stone facings are to be attached to, or connected with, structural members, special thought must be given to the design of the connecting device.

Ineffective devices have often been used for this purpose, and placed in positions with little regard for whether they will be able to fulfil their purpose. Metal connecting devices should be made from non-corrosive materials, or metals that have been rendered non-corrosive by an effective coating. It is false economy to use painted mild steel for this purpose, because the metal is likely to be affected by moisture. Most stone facings are porous and permit the transference of moisture from the front surface of facing material to the connecting devices, which are usually situated only a few inches from the exposed surfaces. The most suitable connecting device seems to be in the form of a bolt on which is loosely threaded a metal plate.

The bolt is passed through the structural member, and the plate inserted in a mortice cut in the joint surfaces of two adjacent stones. When the nut on the bolt is turned, the plate is drawn towards the structural member and accommodates itself against the irregular surface of each mortice. Tee-bolts and hook- and pin-bolts are often used, each having its own particular advantage in certain cases.

Typical construction of a stone fascia course and cornice over a wide opening is illustrated in the accompanying sketch. The fascia stones are shown notched for—and resting on—a B.S.B. and attached to the B.S.B. by a metal plate and bolt. The back of the bottom bed of the cornice stones is shown notched to fit over, and rest on, the top surface of the structural member. This arrangement permits the superimposed load of the walling material to be thrown on to the structural member.



CONSTRUCTION OF FASCIA COURSE OVER LARGE OPENING

CURRENT NEWS

Additions to Nuffield College

A new block of buildings is being erected, costing £200,000, at Nuffield College, Oxford. These additions, designed by Harrison, Barnes and Hubbard, will be constructed of Clipsham stone.

Stone for export?

The Midlands firm of J. R. Deacon has received an inquiry from Boston, U.S.A., for Hollington stone—the kind being used in the building of Coventry Cathedral.

Masons to fight Councils

Seventy-five per cent. of Britain's monumental masons have formed a committee to wage a campaign against local authorities that impose restrictions on memorials in their cemeteries. At a recent Press conference, the committee's secretary said: "We are determined to preserve our ancient craft and the individual liberties of the people we serve."

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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