

STONE FEDERATION
NATURAL
STONE
AWARDS



NEW BUILD – AWARD

**The Queen's Building
Emmanuel College,
Cambridge**

Owner/client
Emmanuel College

Architects/designers
Sir Michael Hopkins & Partners

Consulting Engineers
Buro Happold

Builders/main contractors
Sir Robert McAlpine
Management Contractors

Principal stone contractors
Ketton Architectural Stone &
Masonry

Stone used
Ketton Quarry limestone from
Ketton Architectural Stone &
Masonry.



The Queen's Building is the result of client aspiration, architectural design, craftsmanship and engineering, backed up by a programme of research, testing and development. It provides a refreshing reminder of what can be achieved from a spirit of co-operation between client, designer and contractor.

The architects, Sir Michael Hopkins & Partners, and Buro Happold Consulting Engineers, with masons Ketton Architectural Stone, developed some novel solutions to the particular challenges presented by this unique 30m long by 12m wide, three-storey-high building for Emmanuel College, Cambridge.

The unusual construction features a finely detailed and crafted Ketton stone perimeter structural frame comprising 28 pre-stressed Ketton stone columns and rings of flat arches in the same stone at first and second floor and eaves levels.

The building gives the college a 170-seat, multi-purpose auditorium, seminar rooms, reading rooms and music practice rooms.

The challenge was to find a way of preventing the heavy

acoustic roof from pushing out the walls. Upper floors and a cantilever gallery around the auditorium also had to be supported.

To accommodate the flexural stresses, each stone column is pre-stressed to 250kN by a single, 32mm diameter post-tensioning rod.

The stone columns incorporate precast concrete plinth blocks at ground floor level and pre-cast concrete kneeler blocks at first floor, second floor and eaves levels.

Cast into the plinth blocks and kneeler blocks are cylindrical stainless steel nodes. These provide the dead-end anchorages for the post-tensioning rods at ground floor level and the live-end anchorages at roof level. At the intermediate floor levels the nodes provide access to couplers within the rod lengths, thereby providing a means of access for inspection and replacement.

Cast into the floor level kneeler blocks are socket bars with floor slab reinforcement threaded into them. The roof level kneeler blocks incorporate projecting corbels to provide support for the roof trusses.

The kneeler blocks taper, providing both a natural means for the stone columns to reduce in size at each level and a springing point for the flat arches which form complete, balanced rings at each level.

Around the curved ends the outward thrusts resulting from the arches having to turn the corners are resisted by the kneeler blocks being tied into the floor slabs behind.

An extensive research, testing and development programme was undertaken jointly by the design team and Ketton Architectural Stone, the appointed masons, with most of the testing being carried out at the University of Cambridge engineering laboratories.

Before work began, the masons and the design team established procedures to be carried out during the entire process, from quarry face to completed frame. These procedures were based on a combination of good practice and the results of the

research, testing and development programme and were developed specifically to suit the unique requirements of this project.

Ketton Architectural Stone adhered to the established procedures rigorously during manufacture and construction. The whole frame was completed to tolerances of 3mm and is beautifully crafted throughout.

Judges' comments

A distinctive, well-designed building which, in spite of its non-traditional approach, sits comfortably in its setting with older college buildings. Its scale and proportions are pleasing and its detailing crisp, well thought out and well executed. Elements of traditional stone buildings such as the voussoirs to the arches have been retained and at ground level there is an almost classical slight curve to avoid the appearance of sag. The simple, solid walls of Ketton are untooled and bedded with fine lime mortar joints.