

Set in stone

Concrete has been a key construction material for many years. Claire Cameron investigates why this material has stood the test of time

MORE than 70 per cent of the world's population live in a structure containing concrete and around 10 billion tons of the manmade material is produced worldwide every year. It is the second most consumed substance behind water, but why is concrete still the material of choice for most builders and engineers?

Probably because "no other mainstream structural material can offer such flexibility in supply and adaptability," says Paul Lambert, head of materials and corrosion technology at Mott MacDonald.

"Concrete, whether plain or reinforced, can be readily produced in virtually any shape or size employing a large proportion of locally sourced materials," he adds.

Concrete is used in the majority of buildings, bridges, tunnels and dams and its strength, durability and longevity are among its benefits. It is also the most natural-disaster proof building material and unlike other materials it is not weakened by moisture, mould or pests.

Ultimately, concrete has stood the test of time because "it is the workhorse of construction," says Lambert.

"It is a familiar technology with well-established best practice, standards and guidance documentation for its design, production, placement and maintenance.

"The fact that it continues to perform under a wide range of often hostile or challenging environments is the main driver in its use."

However, there are environments where, without additional precautions, it can be vulnerable, admits Lambert.

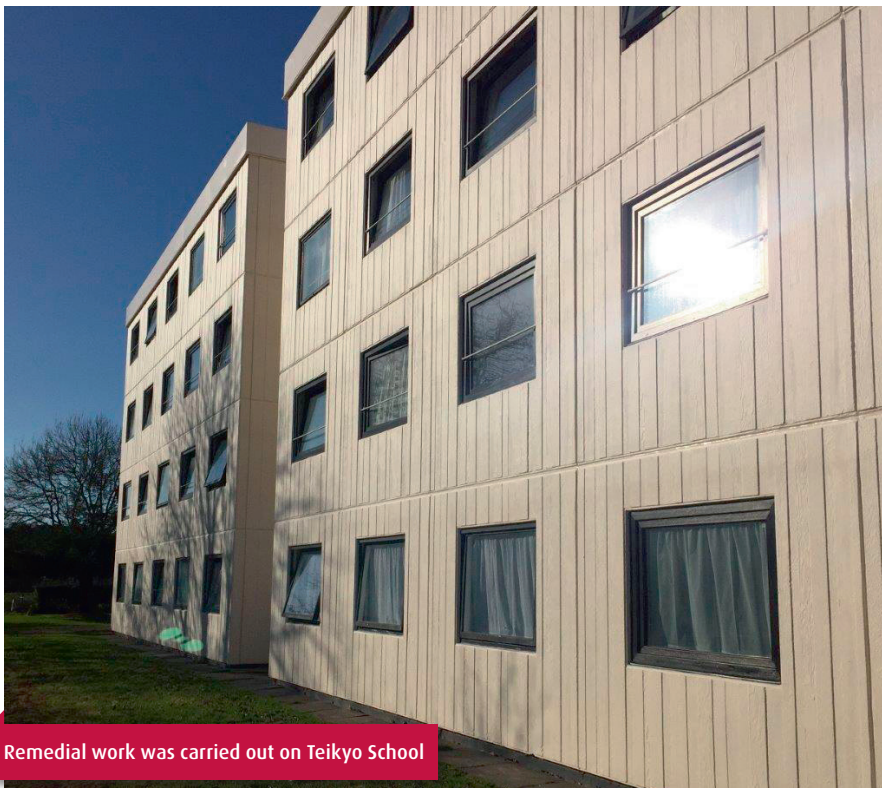
"Concrete can perform poorly in conditions where it is exposed to high sulphate levels or low pH conditions," he says.

Repair and protect

Concrete will last longer than any other building material and Roman buildings which date back almost 2,000 years, such as Italy's Colosseum, provide living examples of its strength.

However, even the concrete and sand built Rome amphitheatre has been damaged by lightning and earthquakes.

This goes to prove "even the most durable concrete built to the highest standards needs repair and protection to help extend its design life," explains Chris



Remedial work was carried out on Teikyo School

Lloyd, director of Flexcrete Technologies Limited.

And closer to home, this has been demonstrated by a concrete repair and coating project carried out at Teikyo School in Wexham, Buckinghamshire.

Built in 1967, the residential facility known as the Fulmer Grange Conference and Training Centre, has a long-standing history with the concrete industry having formerly been the primary training centre for the Cement and Concrete Association (C&CA).

Comprising two identical four-storey blocks, the concrete was made in white cement and was largely board-marked, except for the use of exposed concrete blockwork, the grey blocks contrasting with white concrete.

"The effect throughout was somewhat Scandinavian and due to the repetition involved in the construction of the two blocks, an industrialised method of construction was used – an adapted form of the Bison Wall Frame system," remembers Lloyd.

"Each block was constructed on a 10ft module, with pre-cast concrete loadbearing

cross-walls supporting precast concrete slabs."

Remedial work was carried out by Takenaka Construction and TC&D Construction last year "as a result of concrete spalling on pre-cast panels on the two blocks due to the harmful effects of carbonation over the years," explains Lloyd.

"Monolite, an ultra-high build, low density, cementitious mortar, was specified. Able to be applied by trowel up to 100mm in a single application, it is ideal for the cosmetic repair, rendering and profiling of concrete," he says.

"With ultra-low VOC levels, it can be safely applied in sensitive or confined areas, so there was no disruption to students during the refurbishment work."

Following the concrete repairs, a protective, decorative coating of Monodex Smooth was applied to the external façade to enhance the school's appearance.

Prepare to be flooded

With heavy trucks benefitting from up to 20 per cent better mileage when driven on concrete rather than asphalt, concrete flooring has seen an increase in popularity.