Rising to the challenge

The piling and foundations industry is relentlessly innovating in response to increasingly challenging briefs. Jon Young looks at recent projects.

Boxing clever

Contractor Balfour Beatty has proposed that gantries along the M4 motorway should use a new foundation design developed by specialist Dawson Wam.

A single pile is constructed from a number of interlocking sheet piles, forming a box section. It is claimed to offer the performance of a conventional CFA pile, but can be installed in about a third of the time, gives rise to no spoil, and can be extracted in the future if need be.

Using the sheet piled box foundation also means that no breaking out of pile heads is needed before the pile cap can be installed, contributing to reduced noise, manual handling and potential for injury. By eliminating concrete the number of trades on site can be slashed and quality control simplified. Mobilisation costs are reduced.

The system has received Highways Agency approval and Dawson Wam hopes it will be taken up more widely across the highways network.

Sheet piles form a box section with high bearing capacity.

Reducing wasted space on voids

Having spent 18 months researching ways to replace the petrochemical-based void formers used in foundations, Withers Group set out to develop a new collapsible chair system.

Collapsible steel fabricated support "chairs" are used to create a void in the ground, replacing traditional solutions involving ground beams and compressible cell-core polystyrene sheets.

"These removable and reusable chairs are a major step forward, as the cell core sheets we use in a year equate to three times the height of Big Ben," notes chairman Rob Withers.

The "With-A-Void" chair was tested in workshop conditions before being trialled on a garage reconstruction in Surrey.

More than 25, 250mm diameter open-bore piles were installed to a depth of 8m. The With-A-Void system enabled less excavation to be carried out and reduced muck away costs.

The edge detail of the slab enables the incorporation of gas vents in accordance with National House Builders Confederation requirements and a stepped detail if required, enabling a builder to lay bricks straight off the slab.

Something nasty in the cellar

Contractors building a basement restaurant at the Ross Hotel in Killarney, Ireland, were on the brink of failure last August as they desperately tried to stop ground water surging into the excavation.

Help arrived in the form of a resin injection process supplied by Uretek which enabled the project to restart after substantial delays.

The water table in the area is about 1m below ground level, and the excavation extended 6-7m down. Secant piling was installed in an attempt to seal the perimeter, and submersible pumps employed to deal with anticipated residual water ingress. Yet there were constant problems with flooding.

"There were significant gaps between piles, and because of the high water table, water was coming in as we were digging," says Sean O'Callaghan, site manager for contractor Sean Clifford.

"We tried sealing the excavation with cement grout, but that didn't work too well; it was being washed away. We had to stop digging because of the volume of water ingress."

Uretek used specialised hydro-insensitive resin injected at 1m intervals behind the pile face, 2m from the base of the piling. The resin was designed to set within seconds, forming an impermeable barrier which successfully sealed the gaps between the piles. The firm's £60,000 resin injection operation took 15 days.

Main work on the hotel is due to finish in June.