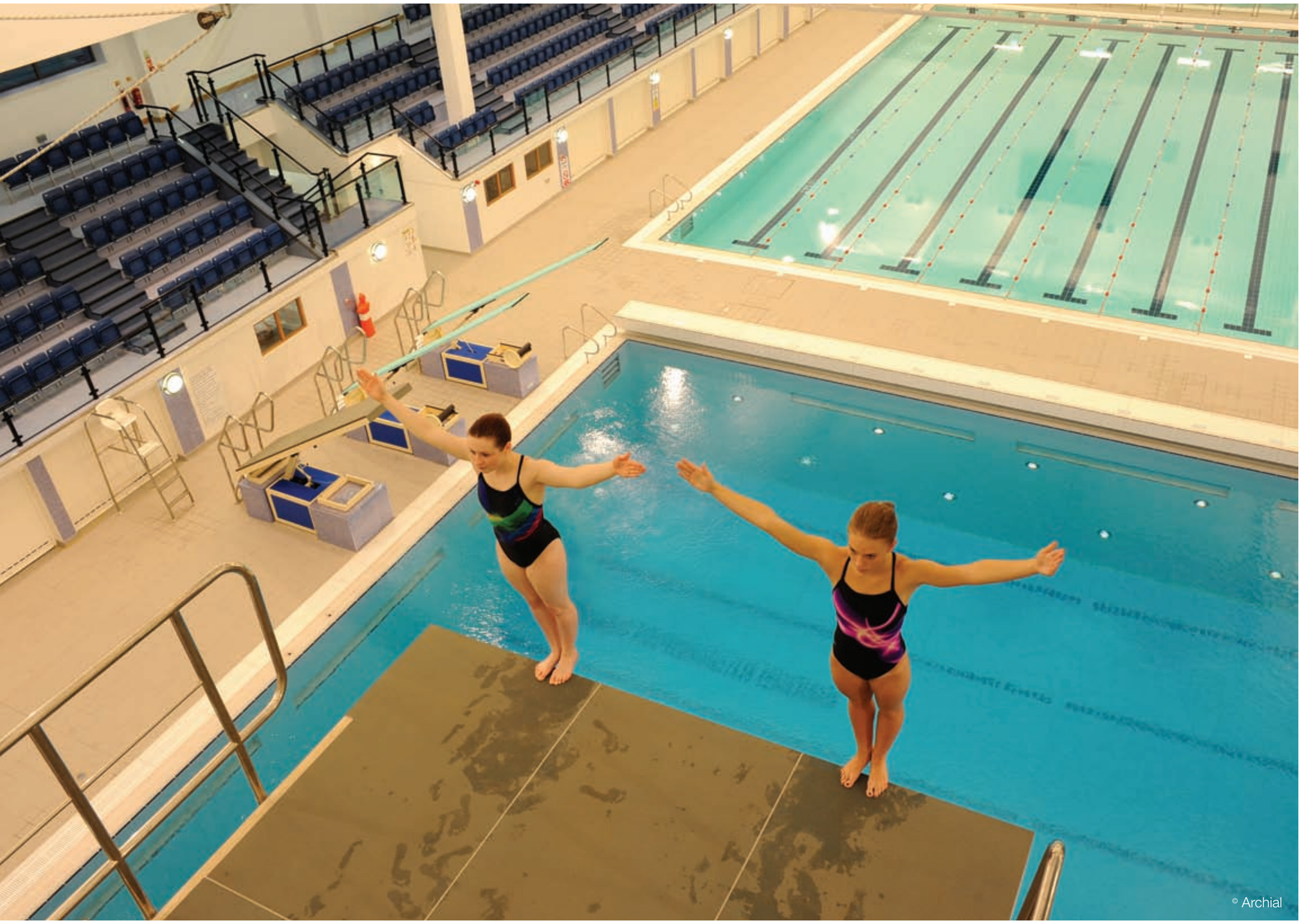
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A pool by the sea

Olympians will soon be training in Southend's new swimming pool using the UK's first precast dive tower. Mark Smulian reports

When Team GB's divers gather for their pre-games training camp ahead of the London 2012 Olympic Games they will do so in a new pool in Southend-on-Sea.

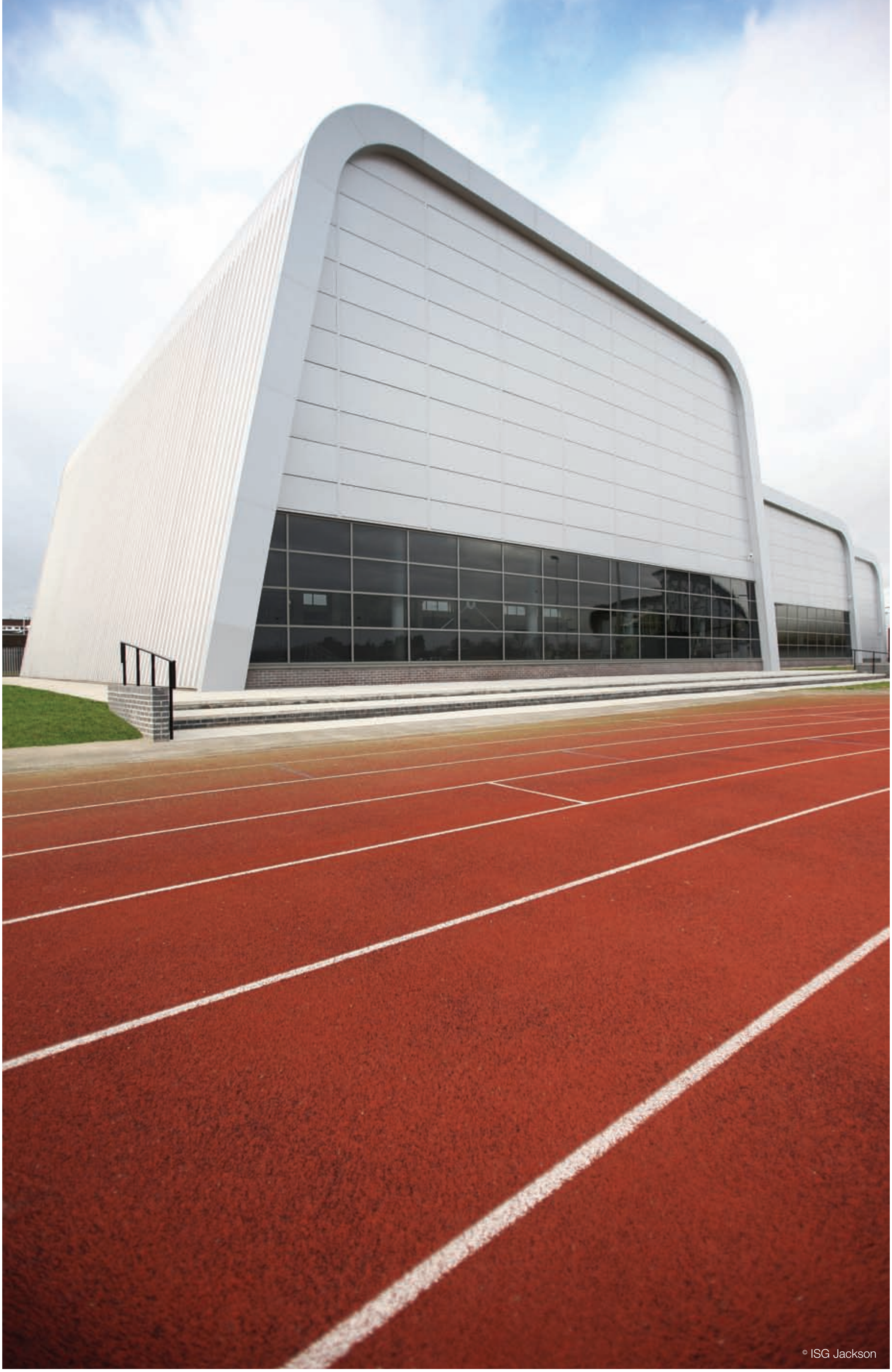
Building a swimming pool at the seaside might sound strange, but the tide goes out more than a mile at Southend, and only the hardiest would swim in the Thames during winter.

The pool at Garon Park is on former netball courts and forms part of a sports complex on the town's north-east boundary, adjacent to an athletics track and golf course and near to where Southend United FC will develop its new stadium.

It has two unusual features - it boasts the UK's first precast dive tower, and its construction was paid for entirely from public money. Southend-on-Sea Borough Council contributed £13 million of the £13.5 million cost, with the remainder coming from Sport England, with no planning gain or land sale required to support the project. This was achieved because the funding was agreed in happier days, and the pool was complete by the time cuts struck local authority finances.

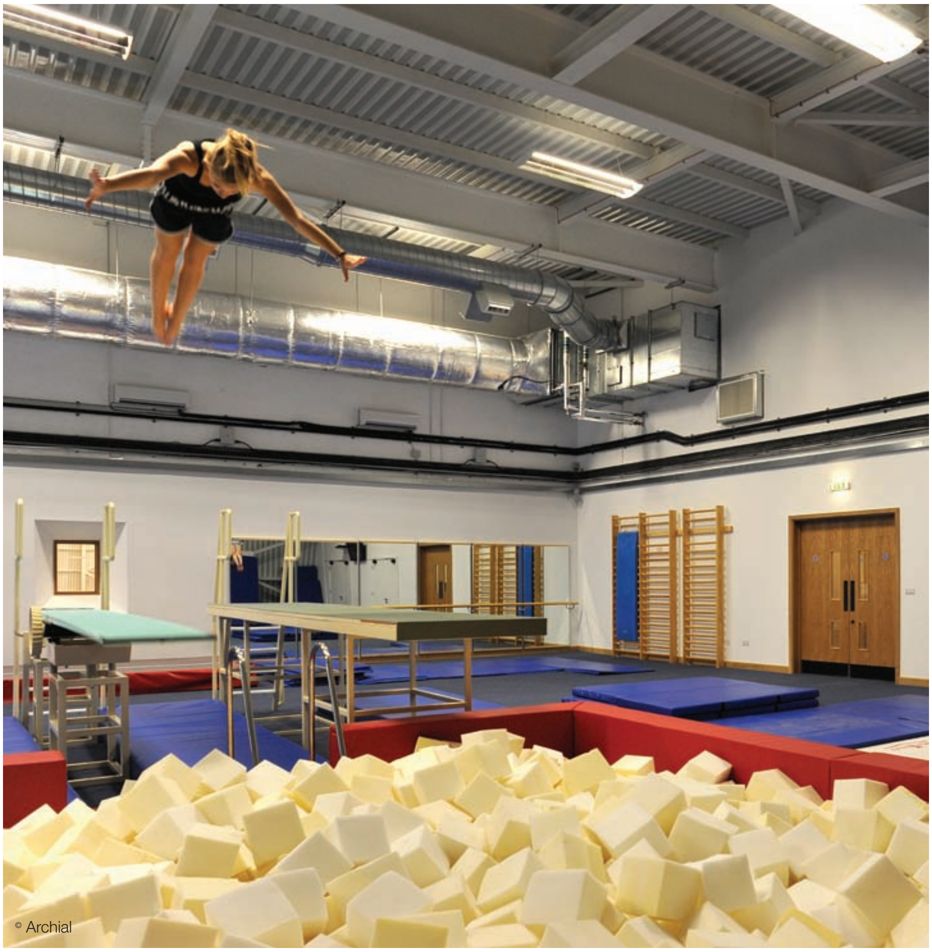
Southend's old pool, in the town centre, was near the end of its useful life after 40 years. The new pool offers eight 25 metre lanes and the pre-cast dive tower structure has four diving platforms – the highest at 10 metres – with a moveable floor beneath the diving pool adjustable to up to 5m depth. There are 374 seats for spectators, a separate shallow pool for children with water features, and a 'dry' dive training hall with harnesses and trampolines for practice.

Archial's project director Paul Weston explains that the council's original design presented a difficulty, because swimming pool



Far left: Southend pool diving
Left: Southend pool exterior

'There are 374 seats for spectators, a separate shallow pool for children with water features, and a 'dry' dive training hall with harnesses and trampolines for practice'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Left: Southend dry dive hall
Above: Southend pool interior

patrons would have had to enter through an area used for tennis.

"We felt it did not work in terms of how people move around the building," Weston says. "That meant the building had to be extended beyond the original 'red line', so a new application was needed for detailed planning permission."

The pool, built on three levels, has gained a BREEAM 'very good' standard. Its lowest single storey covers the changing village, the two-storey element contains the dry diving hall over the leisure and competition pools, and the highest part of the building covers the diving pool and tower. It also steps out as the height increases. Weston says: "The building form is dramatic, stepping up to the diving hall, and is visible from the main road and so will attract customers from a distance away."

A swimming pool is by its nature a wet environment, and special care was needed to ensure that the water stayed where it should be and did not cause structural problems. Ground conditions and presence of groundwater varied across the site. The building is part piled to support its heavily loaded structures, and part ground bearing for lighter structures, where ground conditions allowed this with allowance made for possible differential movement between the two.

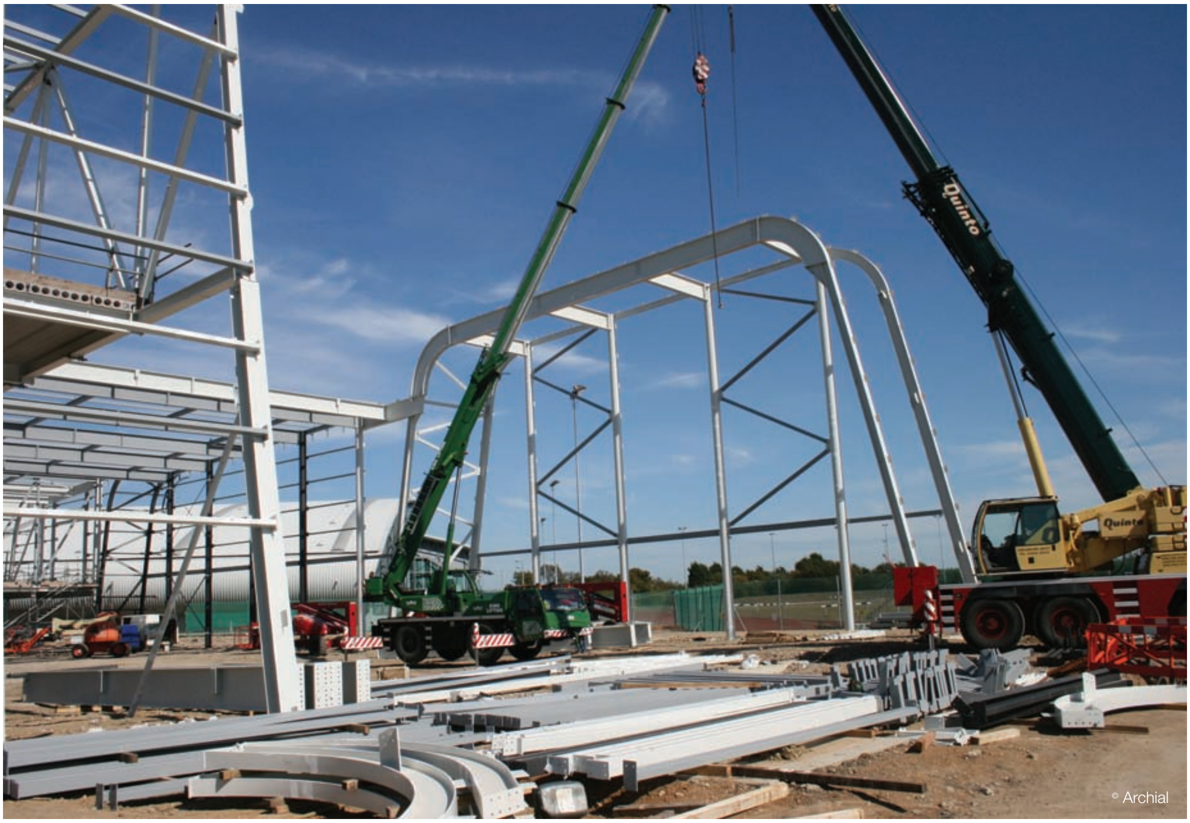
Clay heave control measures were introduced under the slab. With a high groundwater table and granular backfill around the filtration pipework, the water level outside the pool tank could rise to about 1m below ground level and the pressures associated with this needed to be considered for when the pool is emptied for maintenance. Piling was designed to resist these pressures.

An early construction problem was that trial holes identified a groundwater table in the sands and gravels above the London clay at just over 3m deep. Flows were considerable and resulted in the trial holes within the basement area rapidly collapsing.

Weston says that allowing the water into the excavations and pumping it away was not considered an option as this would have affected the quality of the water-resisting construction and could have caused safety problems.

He could not, on cost grounds, use secant walling – with hard

‘The design solution was to excavate down the back of the contiguous piled wall and place a plug of mass concrete about 1m deep to limit flows of water’



Southend pool steel frame construction

and soft piles – to limit water flows into the excavation. The design solution was to excavate down the back of the contiguous piled wall and place a plug of mass concrete about 1m deep to limit flows of water. “This was relatively inexpensive and proved very successful with only slight seepages of water into the works that were easily dealt with,” he says.

For the basement and pool tank Archial’s team decided it could not use normal reinforced concrete construction because it is prone to cracking that would allow water to penetrate. Water resistant concrete construction was used in a special mix that is less prone to shrinkage, with carefully designed reinforcement to control cracking, something the dive tank was at risk from as it has very thick walls to resist the loads.

The contiguous piled walls were used to support the building loads where possible, with an unpropped wall design to allow maximum access for excavation and construction of the concrete works. This design allowed for movement of the piles when soil was excavated as some of the frame was erected before excavation took place. Materials were chosen to provide easy maintenance in a wet environment where “any details not thoroughly thought through can lead to corrosion staining”, Weston says.

The pool’s original design had used long beam spans and a portalised structure to avoid the use of visible bracing systems, which Weston says resulted in a heavy steel frame. Design changes to the front elevation provided the opportunity to brace it to provide stability, and other bracing was then integrated into walls or back-of-house areas where possible to allow a lighter steel frame to be used, which was more straightforward to build, he says.

A decision by the client to include an air-handling floor for air conditioning equipment meant the team could use beam spans that were commercially available, rather than expensive fabricated beams, and the large trusses used to support the air-handling plant and roof structure provide largely uninterrupted views from spectator seating.

One problem with the steel structure was where to put the cranes needed to build it. Cranes capable of lifting the heavy beams and floors require 8-to-10m of working space, which was not available outside because a school and the athletics track abut the building.

“Most pool facilities are constructed from the ground up with the pool tanks and basement areas being built before the frame is built around them,” says Weston. “This would have resulted in

‘Diving Olympians will have first class facilities in which to prepare to go for gold next year’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Left: Southend pool visualisation
Right: Southend pool interior

nowhere to put the crane and would also extend the design programme considerably. On this project the piling works and some of the foundations were constructed first allowing for the frame to be erected early. This was followed by excavation of the pool tanks.”

Access was thus available within the building footprint for the heavy lifting. The main trusses supporting the roof and air-handling floor were delivered in sections, assembled on the ground and lifted in place by two cranes.

Construction began from the lower end of the building, which allowed work to progress while the pools were being constructed. The pool’s most notable feature is the dive tower, which is prone to splashing from the pool and therefore needed to resist corrosion. “This led us to develop a concrete solution,” Weston says. The requirement to install the tower after the steel frame and pool construction then pointed to precasting.

However, there were complex phasing problems. The dive tower is supported on the edge of the dive tank and could not be constructed until the tank and ground floor were complete. But the dive tank could not be dug out until the steel frame was built, and sections of the tower weighed well in excess of 10t and needed heavy cranes to install them. The tower had to be constructed within the building, resulting in the need for part of the frame to be left down until the tower was installed. The frame design had to allow for deflection of the completed sections of roof when installing the columns.

Once the building was near completion one problem remained – how would people get there? The council did not want patrons to rely on cars, yet the pool’s remote location on the town’s periphery made access difficult. The council came to an agreement with bus operator First that will see a journey to Garon Park every 20-30 minutes on weekdays and hourly on Sundays.

Diving Olympians will have first class facilities in which to prepare to go for gold next year.

Client and planning authority – Southend-on-Sea Borough Council
Architect – Archial
Cost consultant – Castons
Structural engineer – MLM
Services engineer – Silcock Dawson and Partners
Main contractor – ISG Jackson
Public transport – First Group Buses
Leisure management – Parkwood Community Leisure