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hotel in the UK**
Coworth Park completed



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Shard and fast: EU's tallest building continues to rise

The Shard of Glass at London Bridge has been continuing its heavenward climb throughout summer 2010. The tower, which will be the largest in the EU upon its completion in 2012, is now roughly the same height as neighbouring Guy's Hospital. Its recent spurt in growth will now slow while the steel work catches up with the thrusting concrete core.

Lofty though the tower already appears, it's not yet even half way to its eventual 310 metres. The mid-level public viewing galleries are approximately the same height as the London Eye and the top levels will provide views from a height previously unattainable both in the UK and Europe.

The development is run by Sellar Property Group with the backing of the State of Qatar, which is the majority shareholder in the development that forms part of the £2bn London Bridge Quarter regeneration scheme. Mace Group has been leading the construction effort.

The tower is part of the London Bridge Quarter, which will comprise two buildings: the Shard and London Bridge Place, covering a total of about 1.4m sq ft. This in turn forms an integral part of the redevelopment of the area including Thameslink 2000 upgrades and Network Rail's project master plan. The Shard will have 586,509 sq ft of offices along with a five-star hotel, restaurants, viewing platforms and residential apartments.

The Shard is one of the most enigmatic buildings to adorn the London skyline in recent years. The vision of its creator, the much lauded Italian architect Renzo Piano, was for a vertical 'City in the Sky', or an urban village concept.

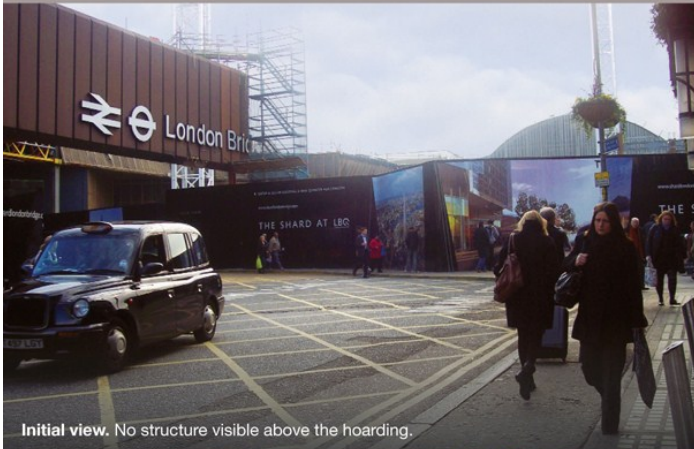
The Shard replaces the Southwark Tower, a 1970's building located on London Bridge Street. The new tower offers high density vertical development at a transport hub and will, it is claimed, be the UK's first truly mixed use tower.

"This is all about the regeneration for the area," commented public relations consultant Baron Phillips. "This will be a part of everything already on the South Bank from Borough Market to Bankside. We want to make it an exciting place to live, work and play".

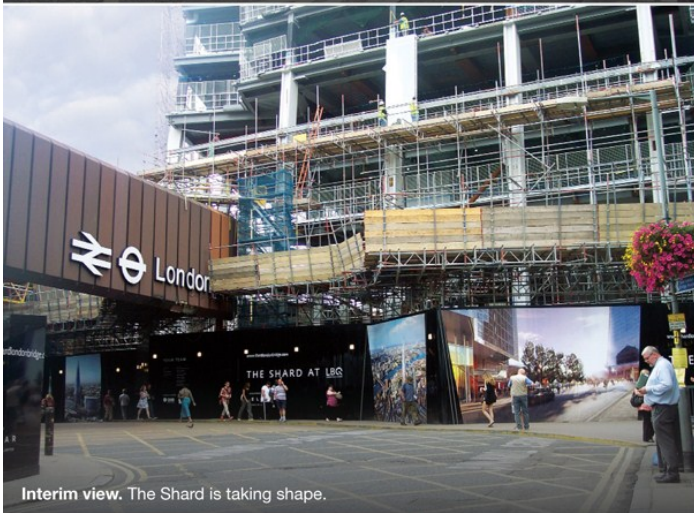
Aside from The Shard, the Quarter development project will see the construction of London Bridge Place - another office building, but one that will be considerably shorter than The Shard. London Bridge Station will also get its share of refurbishment as part of the scheme.

Baron recently said, "The idea came about because there were calls from government for new skyscrapers focused around transport hubs. Figures show that around 350,000 people a day travel through the area, so the new development means that commuters and visitors will soon be able to come straight out of the station and up the lifts to their office".

Premium quality temporary hoardings and welfare facilities for The Shard



Initial view. No structure visible above the hoarding.



Interim view. The Shard is taking shape.



Current view. The building towers over its surroundings.

- Modular fast-fit hoardings and dividing walls
- Panels can be re-located or recycled
- Bespoke configurations throughout the site
- Temporary welfare facilities on 20 floors



A temporary satellite canteen installed on Level 5.

Kwik-Klik's innovative temporary hoardings and welfare facilities systems are helping MACE and the appointed contractors to keep the construction of The Shard on track.

Our robust, lightweight and eco-friendly hoarding systems replaced an old fashioned timber system around the site perimeter and at concourse-level adjacent to London Bridge station.

We have also installed temporary welfare facilities, including offices, canteens, changing rooms and WCs on 7 floors of the building. Further temporary installations are planned on an additional 13 floors.

Our systems contribute to site safety and ensure that contractors working on higher floors have

access to office and welfare facilities without having to descend to ground level.

Three Kwik-Klik panel systems are in use on the site – *Ultraspan Extra*, *Duraspan* and *Soundmaster*. They are used in bespoke configurations which incorporate doors, windows, serving hatches, gates, lighting, plumbing and electrics.

Kwik-Klik has been working with MACE and appointed contractors, Dhési and Allendale, on The Shard site for 18 months. Our systems will be used for the duration of the 5-year project.

For a closer look at our market leading range of systems go to our websites today, call us on **0845 058 4999** or email **tony@kwik-klik.co.uk**.



Kwik-klik

FAST-FIT INTERNAL HOARDINGS

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ECO-FRIENDLY EXTERNAL HOARDINGS

HYGIENIK
SYSTEMS LTD

INGENIOUS WALLS & CEILINGS

Temporary, re-locatable welfare facilities introduced as The Shard advances skywards

Kwik-Klik, the hoarding specialist who designed and installed the robust and eye-catching hoardings around The Shard site, has come up with an innovative solution to the age-old problem of providing temporary site office and welfare facilities during the construction phases of a skyscraper.

As the construction and M&E workforce continually move upwards from floor to floor, the provision of temporary offices, canteens and WC blocks is vital to avoid long commutes down to ground level.

At its peak, over 2,000 contractor and trade personnel will be working on The Shard on any given day. The final building will have 70 floors and office and welfare facilities will be spread at intervals on 20 separate floors. At the time of going to press in August 2010, Kwik-Klik has installed facilities on 7 floors and the highest of these is on Floor 20.

Versatile and modular systems

The temporary dividing walls which create the temporary facilities incorporate doors, windows, serving hatches and WC cubicles. They are made from modular and versatile plastic panels which can be fitted quickly and are easy to dismantle and re-locate.

As the different construction, trade and fit out teams move up the building, the Kwik-Klik temporary installations will provide them with accessible facilities. When they are no longer needed, they will be re-located on higher floors, or removed completely as the building nears completion.

The high-strength Duraspan and Soundmaster panels are easy to handle, which makes installing and dismantling them quick and easy, unlike the time-consuming process of plastering new walls and waiting for them to dry. Electrical wiring and plumbing can be easily and safely routed through the floor-to-ceiling panels and configurations, room sizes and door locations can be adapted to the bespoke dimensions and internal structure of each floor.



A temporary canteen on Level 5

Space saving and time saving

The original ground level office and welfare facilities, which previously took up valuable site space, have now been completely removed and all facilities are now housed within the footprint of the building.

The welfare facilities are based on Kwik-Klik's innovative Construct-a-Box system which can create freestanding structures with roofs as well as the internal floor-to-ceiling configurations being used at The Shard. Kwik-Klik will remove all of the panels and fixings as the project nears completion and they can be re-used or recycled adding to the green credentials of the project.

Kwik-Klik's perimeter and concourse-level hoardings, which feature stunning graphics designed by the developer Sellar,

have already been in place for over 18 months and will remain for the entire five year cycle of the project.

A bespoke solution

Kwik-Klik Managing Director, Tony Doherty says "Our role at The Shard has expanded as the project has gathered momentum. From the beginning we have responded to the priorities set out by the MACE team, who are the main contractor. Working closely with them we have submitted proposals for the site perimeter hoarding, graphic overlays, concourse-level hoardings and the multi-floor temporary office and welfare facilities.

Temporary washroom facilities



"We are also working on site with the appointed contractors, Dhesi, Allendale and others, to ensure our installations are delivering maximum benefits to the contractor teams and enabling the project to progress quickly, safely and without delays."

"Our innovative temporary welfare facilities are bespoke to the requirements of the contractor teams and are designed to fit neatly within the layout of each floor where facilities are needed."

"Once a floor is vacated by the contractors, we will dismantle the facilities and re-locate them on a higher level, or remove them from the site. Panels can be re-used several times and at the end of their usable life they are recycled, which adds to green credentials of The Shard project."

For further information visit: www.ecogenik.co.uk and www.kwik-klik.co.uk



Installing the temporary walls



The enabling works were extensive. The structure of Southwark Towers helped laterally restrain a number of the old brick arches on which London Bridge station is constructed, and these first had to be tied back to prevent them moving.

On top of this, part of the supporting structure for the bus station concourse protruded into the basement of the existing building and had to be demolished to make way for the second floor level of the new building. To allow the bus station to remain operational, mini piles were installed in a confined area with concrete foundations and steel columns used to prop up the concourse.

A corner column of the train shed roof at London Bridge station also lies within the site and the slab around this column had to be broken out to make way for the setting out of the building. This column is listed and steel supports have been positioned beneath it to allow the slab to be demolished around it.

With both of these new supports, hydraulic jacks have been incorporated into the bases. "We are constantly monitoring the position of these structures and if there is any movement, we get an alert and we can compensate for it by jacking up the support", says Roma Agrawal, structural engineer with WSP Cantor Seinuk.

The first batch of 11,000 glass panels that will form the façade of the 310m Shard of Glass have been put in place. Mace has set a target of putting the glass in place on the skyscraper at a rate of one floor a week.

The panels, which in total will cover an area of more than 56,000 sq metres, are made of a low iron glass with internal blinds. The glass is manufactured in Germany with the panels assembled in Holland.

On arrival, the panels are erected from the internal floors, eliminating any hazards that could come from an external erection method. Three crews are working flat out slotting the panels into place.

The Shard is scheduled to be completed by May 2012, in time for the London Olympics where the building will form a stunning backdrop to the Games.

The Shard forms part of the £2 billion Renzo Piano-designed London Bridge Quarter regeneration project around London Bridge Station which is being developed by Sellar Property Group in conjunction with the State of Qatar. The programme commenced on 14th January 2008 with the start of hard demolition to Southwark Towers and completion of shell and core is scheduled for May 2012.

SolData

A comprehensive 'real time' regime of remote monitoring has been successfully designed, installed, commissioned and operated by SolData. The purpose of the monitoring is to determine the seasonal characteristics and long term structural performance of the neighbouring structures during the demolition of Southwark Tower and the subsequent construction of the Shard. London Bridge Station including facades, escalators, viaduct arches, running tunnels, station platforms,

pedestrian walkways and the brick vaults that support the main concourse area of this Victorian structure and Guy's Hospital are being observed throughout the lifetime of the construction project. The monitoring system is being achieved using 20 high precision robotic theodolites working in tight networks (Cyclops) which observe absolute movements to sub millimetre accuracies and over 250 classical remote instruments including a system of inclinometers embedded in the Shard basement walls allow local, relative displacements to be determined.

The control and operation of the Cyclops systems are enabled by SolData's own in-house software and the automatic, wireless acquisition, data management and visualisation of the entire remote system is provided by SolData's presentational software, Geoscope. Geoscope also allows preset triggers to be included and will automatically generate alarms if these triggers are breached. In this instance, the alarms are on the screen and via text messaging which is directed to selected interested parties. To supplement the remote monitoring and provide a degree of redundancy, a precise survey network has also been implemented through the project with the data exported into the Geoscope software so that direct comparisons can be made between the manual monitoring and the remote systems.

4D BIM Synchronises the Shard

At the Shard, Mace wanted 4D BIM software for "visualised planning". Synchro Professional integrated and flexibly displayed design with site infrastructure.

The concept of 4D modeling is not new. The industry has been producing computer generated animations representing the construction process for high profile projects for more than 20 years. However, these animations were scripted movies, not live connections between the 3D model and the construction schedule. They could only be edited through the computer animation package and were rarely detailed enough to facilitate construction planning in the field.

The recent industry push toward BIM and associated software advances are now making 4D modeling accessible and affordable for the average construction project. Software packages such as Synchro allow the 3D model to be linked to the CPM construction schedule with relative ease.

Synchro improved communication with stakeholders. It linked the dynamic scene with different timelines and displayed the ongoing consequences of building strategies.

The logistical implications of Synchro's programme has helped Mace to position cranes, roads, parking and earth stores in the busy city centre site.

Synchro visually compared strategies shared with different trade specialists and enabled Mace to orchestrate project logistics in real time and spot potential problems in the deployment of tower cranes. Issues in the MEP scheduling were highlighted before they became a problem.

To find out more, visit www.synchroold.com

Transport for London (TfL) initially signed up for 200,000 sq ft of office space in The Shard in 2006, but recently had their contract bought out by the very developers that are building the new skyscraper.

"It suited us and them for us to buy them out. It's a tremendous reflection on the outlining strength of the market," commented Baron.

He continued: "We don't expect to let all the space to one tenant. We expect it to be lawyers and City type businesses. The market currently is so strong - there will be over the next four years a lot of leases for renewal or break".

Jump Lift

The UK's first 'Jump Lift' has now been successfully installed in The Shard. Developed by KONE, the self-climbing elevator system provides an alternative to exterior hoists to improve the efficiency and safety of the building's construction.

The lift functions by using the building's permanent shaft during the construction phase and moves higher or "jumps" in the shaft as the building gets taller. It allows shaft construction and lift installations to continue at the higher levels while the lift is operating in the same shaft at the lower levels below a protection deck. This innovative approach enables the lift shafts to be used to aid construction at the same time as they are fitted out with permanent cars and put into service as construction progresses.

Tony Palgrave, construction director for Mace on the Shard, said, "This solution is fundamental to our strategy of transporting people and materials quickly and efficiently to the top of the building and down again in the safest possible way. It represents our ongoing commitment to finding ever better ways to deliver this landmark project".

Michael Williams, managing director of KONE UK, added, "We work hard to deliver pioneering solutions for clients and it has been a privilege to be involved with Mace on such a significant project as the Shard. KONE Jump Lifts are an innovative solution that improves people and goods flow and speeds up construction. Our team has worked closely with Mace to ensure the installation of the Jump Lifts runs smoothly and enhances the construction process".

As principal contractor on the Shard, Mace has ensured the delivery programme accommodates the requirements of the KONE jump lifts. The first lift has capacity for 21 people and 1,600kg in weight and will mainly be used at the Shard for site workers to get up and down the structure. It will initially serve up to level 12 but will eventually extend to level 26.

In total there will be five Jump Lifts, the largest of which will be equipped to transport 45 people, with a capacity of 3,500kg in weight of people and materials, serving up to level 34. The lifts will follow the rise of the structure into the London skyline. The highest of the Jump Lifts will go up to level 66. KONE is supplying and installing a total of 10 escalators and 36 lifts at the Shard, 13 of these double deck lifts including the five Jump Lifts.

Mace

Mace carried out early project management services which evolved into construction management before a final evolution to a fixed price solution. The early demolition and enabling works were carried out under a construction management contract and the main permanent works delivered under a fixed price contract.

700 truckloads of concrete were poured to create the building's foundations. The 5,500m³ single concrete pour is one of the largest ever undertaken on a building in the capital. This culmination of the building's ground works package has created the raft foundation that will support the tower.

A ventilated double skin façade will considerably reduce heat gain to increase comfort levels and allow the maximum level of natural daylight to enter. Excess heat generated by the offices will be used to heat the hotels and apartments. Any additional excess will be dissipated naturally through a radiator at the top of the tower.

The Shard's construction team has had to contend with the logistical nightmare presented by a constrained site. As well as

the thousands of commuters coming into London Bridge station every day, there is also a bus station on the doorstep which has to remain running. On top of this, Guy's Hospital is across the road from the site's main access gate. Together with pedestrians and narrow access roads, moving materials to and from the site is a major challenge.

At the peak of the recent concrete pour, trucks were arriving on site at two-minute intervals. Three concrete pumps were installed that were capable of pumping up to 150m³ an hour to enable the turnaround time needed to keep the trucks running. These were coming from four batching plants from as far as Greenwich in the east and Battersea in the south. According to Don Houston, senior project manager with concrete contractor Byrne Bros, this was to spread the risk. "We could probably have got away with using two plants, but if one goes down you lose 50% of the capacity. This way there is less risk".

Tim Goldby, director of Mace, says a lot of experience on lorry movements was gained when they were carrying out the bulk excavation, when trucks were leaving the site every three minutes. "We worked out primary and secondary routes for the trucks and planned it all in consultation with Southwark council and all the major stakeholders".

When concrete cures it generates heat and the sheer volume of the pour, which measures about 50m by 60m and is up to 3m deep in places, means that the high levels of heat produced could result in shrinkage and cracking.

The mix used ground granulated blast furnace slag to replace 75% of the cement, which helps to limit the amount of heat generated.

The downside of using a cement replacement is low early strength gain - 56 days compared with 14 for a mix using ordinary Portland cement - so the mix was developed to make sure it would achieve sufficient strength gain over the first 14 days to meet the structural requirements, with the full strength coming later.

The concrete also needed to flow easily around the densely packed reinforcement bars at the base of the slab. Additives - plasticisers, retarders and others - were included to give good flow characteristics, delay setting times and prevent "bleed", which is a common result of using high levels of cement replacement.

The concrete was poured in layers 750mm deep. This helped limit heat build-up and also regulated the placement so that succeeding layers could be poured before early layers had set.

A computer programme was created to predict the temperature of the core, and thermocouples were fixed to the reinforcement cage in the raft to enable the temperature to be monitored. The mix recipe could then be altered at the batching plant if needed.

To limit heat build-up in the confined space while the pour was under way, fans were used to draw air through the basement and ventilate it out through the mole hole where the excavation occurred.

Lorry deliveries to the site are strictly controlled with a buffer zone a few miles away where vehicles are held and dispatched to site at regular intervals.

