CLARIDGE'S HOTEL.

Delivering the impossible: A five star basement for Claridge's Hotel.

Maybourne Hotel Group proposed to expand facilities at Claridge's the five-star hotel in the heart of London's exclusive Mayfair district. The owners wanted to enhance the services and capacity offered to their guests, but needed more space in order to do it. It's central London location meant that extending at street level was not feasible, so an alternative solution was found: excavating under the hotel's Art Deco wing.

McGee Group developed a methodology to excavate and construct a five-storey basement while the hotel remained fully operational, something others believed to be impossible.

This was a uniquely complex and challenging project, as it required the design and construction of a 22m-deep basement and 30m-deep foundations beneath a 90-year-old concrete raft slab founded on material that was difficult to safely excavate. Adding to the complexity, in order to avoid disruption to hotel guests, all construction materials, machinery and excavated spoil needed to pass through a single 2m x 2m window.

We developed a solution that involved coring through the existing basement raft slab in a single 2m x 2m location, and from there constructing horizontal tunnels (more than 400m in total) under the slab to below each of the 61 columns requiring support, with four additional columns supported on new transfer structures.

Vertical shafts 1.8m in diameter were then hand-dug beneath each of the columns. These needed support to depths of 30m in order to form caisson foundations. A five-storey reinforced concrete column was built within each shaft up to the underside of the existing raft to provide vertical support to the superstructure above.

LOCATION.
Westminster, London

CLIENT.
Maybourne Hotel Group

STATUS.
Complete

EXPERTISE.
Complex basement

Tunnels.

The tunnels were hand-dug in 500mm sections, with 152 UC steelwork sections used to frame the tunnel on all sides. The steel was light enough to be put into position, bolted and assembled on site. The frames were placed at 500mm centres, with steel plates inserted between the side frames and the voids grouted behind to control movement. The top of each frame was jacked and dry packed against the underside of the raft to minimise raft settlement. Carrying out the excavation in such small sections meant any imposed distortion on the existing slab was reduced. The tunnelling was carried out by our team of 15 experienced miners, using hand-held pneumatic spades.

Shafts and Cassion Foundations.

Vertical shafts, 1.8m in diameter, were constructed below the 61 building columns that needed support, with a reinforced concrete collar used to frame the top of each shaft. Miners worked 24 hours a day across two 12-hour shifts. Three separate teams worked on a shaft each, with no two adjacent shafts excavated at the same time, in order to minimise any raft disturbance.

Two miners hand-dug each shaft using pneumatic spades and, as they excavated, installed 1m-deep temporary steel liners manufactured specifically for the project. To speed up construction, a second access point through the raft was constructed.

Once complete, the basement area was excavated around the new columns to create the basement space. All 25,000m3 of excavated material was removed through the one window at the rear of the building, with all equipment used in the excavation electrically operated to minimise noise, vibration and possible pollution.

Extensive analysis of the existing building foundations were required to understand the load path from the building and determine its response through all phases of the work. Movement had to be limited, as excessive displacements would have had serious consequences for the structure, sensitive listed heritage features and – most importantly – the hotel occupants. Movement monitoring and control was paramount during its construction.

Service shafts below Victorian wing.

Two service tunnels were constructed underneath the Victorian section of the hotel to provide building services routes into the basement, along with a lift and stair core. The new access core serves the first three basement levels, providing a shorter route for hotel guests and staff into the new facilities.

The tunnels were built to provide services access to the lowest level. These works were all carried out at night, with the excavated material removed in wheelbarrows through the hotel corridors. The 4m diameter vertical shafts were built first, with the 3m diameter horizontal tunnels then constructed from the basement to reach the shafts. These shafts, tunnels and connection chambers were as logistically challenging as the main basement

The tunnelling works, shaft excavation and construction of the columns took 18 months. Once all the columns were built and preloaded, the tunnel steelwork could be carefully dismantled and the ground beneath the existing raft removed.

When the first basement level was fully excavated, it created space to construct a 750mm diameter, 19m-deep contiguous pile wall around the basement perimeter. A modified electrically powered piling rig was used for this work to avoid diesel fumes and reduce noise. The rest of the basement was excavated and built using traditional top-down construction, with each basement level taking two months to excavate and construct.

The £37m basement works were delivered on budget, four months ahead of programme and carried out while the hotel remained fully operational at all times.

Material Removal and Delivery.

- During the peak earth removal, 140 tippers were loaded during one day and up to 70 trucks per day. 75,000m3 of London clay excavated
- Transportation and installation of six steel trusses weighing 65tonnes within a centrally located site - 400 tonnes of structural steel installed in 3 nights

Project Highlights and Key Works.

- 5,500 m2 Basement created
- More than 400m of horizontal tunnels were constructed in total
- 63 existing building columns
- 25,000 m3 of material excavated
- 5 Levels of basement created
- 23 meters below the existing Art Deco wing
- Basement level one was excavated directly below the 1920s raft slab
- All construction materials, machinery and excavated spoil passed through a single 2m x 2m window
- Works were completed while the hotel remained operational with limited disruption to guests

Media Highlights.

- New Civil Engineer
- Financial Times
- Construction Enquirer
- iStructE
- Ingenia
- GePlus
- ICE

McGEE
A Specialist Engineering Contractor.