



View of the building

THE PROJECT “Hotel, Dubai”

Contractor:	NSCC International
Location :	Dubai, UAE
Completion time:	2017
Equipment:	Drill rig type Hütte HBR 202 E Preventer system with self-drilling micropiles
Production:	300 self-drilling micropiles (total 4,680 m) and 580 tube a manchette steel grouting tubes (total 2,132 m)

The Challenge

A hotel in Dubai, UAE, which was built in 2007 and consists of eight stories and two basements, had undergone some structural movement within the basement, leading to cracked columns, walls and slabs. Since 2017, water has been penetrating through cracks in the basement slab and walls. Moreover, the hotel has been suffering differential settlements.

An assessment of the building was carried out and the consulting engineer compiled a detailed design to enhance the stability of the structure, which involved a combination of grouting and micropiling.

The issue was that the micropiles and tube a manchette steel grouting tubes needed to be installed in a basement area, subject to a high water table. This could have been achieved with temporary dewatering. However, this was not the preferred option owing to the location of a nearby underground metro station.

The minimum proposed treatment area defined by the consultant represents a total of 2,456.3 m² and 1832.2 m² when excluding the piling caps area.

The Solution

The scope of works included designing a suitable ground enhancement scheme increasing the density, strength and stiffness on the one hand and reducing permeability of the soils immediately underlying the basement slab on the other hand. The treatment area is generally located along the perimeter of the basement where most of the defects were identified. The depth of treatment should mainly be the overburden sands directly below the basement slab.

A solution based on underpinning using micropiles was designed and “Tube A Manchette” grouting to enhance the strength and stiffness of the underlying soils and to reduce permeability.

The preventer system and the self-drilling micropiles were specified and employed to install the micropiles instead of temporarily dewatering the site. The preventer allowed the successful installation of over 300 self-drilling micropiles and 580 tube a manchette steel grouting tubes and further soil tests. The micropiling was carried out at a level of -4.45 m (ground water at -1.45 m) without the need to temporary dewatering. The preventer is a valve system which is connected to a compressor via an air line. The system is operated by opening and closing the rubber insert, by applying air pressure to inflate (close) or deflate (open) the rubber insert. When the rubber insert is in the closed position, it restricts the ingress of water whilst pressing tight against the micropile, allowing the installation and grouting to be completed. The preventer is fixed securely to the structure prior to commencing the installation. It is removed once the grout has completely cured, exposing the top of the micropile ready for the head detail to be constructed.

All the drilling and injection works were to be executed from the second basement with a restricted headroom of 2.5 m. Both the confined space on site and the health and safety concerns regarding the fumes forced the contractor to use all electric machinery including the low headroom electrical drill rig from Hütte Bohrtechnik, type Hütte HBR 202 E.

The machine is compact in size and offers a telescopic mast that can extend up to 2.7 m height with a powerful rotary of 2.8 tm torque. Drilling of all 312 micro-piles and the 582 TAM pipes was done using only this machine working in double shifts.

The Result

The micropiles were installed and grouted using the preventer and implemented to strict health and safety procedures. The whole procedure enabled the contractor to maintain an excellent production rate, all to the satisfaction of the site engineers as well as the client.

The real benefit of the preventer system was that it allowed the installation and grouting of the micropiles in a restricted working area – without the need for temporary dewatering. It has been estimated that there was a £ 350,000.00 saving achieved on this project by using the preventer system instead of dewatering.