"High tech between tall towers"

Hong Kong – West Kowloon Terminus Station South

Projektentwicklung

Die Aufgabe

Sheet piling to be driven to depths of 35m through filled materials and CDG (Completely Decomposed Granite) layer.

Die Herausforderung

- **Establishing a high-technology alternative to traditional pre-boring by the ODEX method and sheet piling with 12m single piles**
- **Overcoming obstructions and boulders with little effort**

Der Baugrund

The subsoil is composed of a matrix of filled material, gravels, and boulders. At some locations, rock mounds and concrete blocks from the old seawall lie on top of the CDG (Completely Decomposed Granite) layer.

The method adopted

Instead of the ODEX method, the pre-bored holes are formed using the Double Rotary Drilling Method. This is the combination of an outer casing with a continuous flight auger. Both are driven into the ground in counter-rotation to loosen the soil and are withdrawn again by rotating in the reverse direction so that only a very small amount of soil is extracted. The casing diameter is approx. 810 mm and the bore-holes do not overlap. No major costs are incurred because diesel-operated compressors of sufficient capacity are used.

If hard rock boulders or large obstructions cannot be drilled through using standard drilling tools, the casing shoe and the auger starter can easily be removed and replaced temporarily by a core barrel. In this way, cased pre-drilling down to approx. 20 m is possible. Beneath this level down to 32 m, uncased drilling can be carried out by assembling a 12-meter auger on top.

As a result, the sheet pile driving is made easier, obstructions and boulders can be overcome and vibration impacts and the the effects of the noise level on the environment are reduced.

Sheet piling works are executed by a PVE Dieseko vibrator 40 VML. Using this high frequency variable vibrator, performance is improved and unwanted external vibration and noise are both reduced, which means less impact on the environment. Accordingly sheet piles can be driven in pairs without difficulty. The carrier unit, a Liebherr LRB 255 rig with pull down (force: 400 KN), is able to handle double sheet piles with lengths of up to 27 m.

To take advantage of these technological advances, sheet piles must be prepared before being grabbed with the LRB 255. An independent working unit at first assembles single piles in pairs and, in a second step, welds two double piles of 12 m to form elements of 24 m. This guarantees that the piling rig is fed without interruption.

The double rotary drilling method in combination with uncased pre-drilling and the driving of double sheet piles with a length of 32 m as realized on the West Kowloon Terminus Station South, is a fundamental technological advance for deep foundation work in Hong Kong. It enables an average daily production of xxx drilling meters and yyy m^2 sheet pile wall.

Maximum profitability is combined with reduced impact on the environment.