Deep Foundations - Barrette Piles

Diaphragm walls - Ground anchors - Piles - Micropiles

NILE CITY

CAIRO - EGYPT

Retaining wall and foundations for 36-storey property with four basement levels

The twin 150m-high towers of the riverside Nile City complex on the Nile in North Cairo will house offices, apartments, a business centre, cinemas and a shopping mall, with four basements levels for parking and services.

The difficult geology at the site called for a range of specialist construction techniques, provided by SBE under separate and joint contracts.

The specialist works required comprised the excavation of a 16,000 m^2 area to a depth of 14m, and deep foundations for the towers and other structures.

The ground conditions (water table 4m below surface) and great thickness of alternating sands and clays called for the following works:

- Construction of a peripheral diaphragm wall to a depth of 30m to reduce the pumpage requirement for dewatering the excavation. The wall was tied back with a double bank of ground anchors. The trench was dug by hammer grab. All joints were fitted with full-height double water stops (CWS process).

Artists impression of Nile City complex

OWNER:	NILE CITY INVESTMENTS
ENGINEER:	HAMZA ASSOCIATES
CONTRACTOR:	SOLETANCHE BACHY EGYPT
CONSTRUCTION PERIOD:	JULY 1998 - JULY 1999

MAIN QUANTITIES:

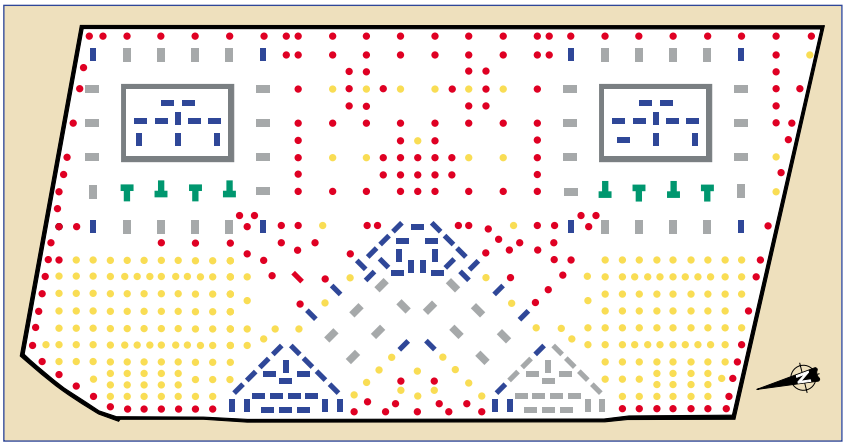
Diaphragm walls
- 0.6m thick, 30m deep
14,099 m^2 excavated area

Barrettes (depth 41m)
- 119 no. 1.0m thick
- 60 no. 1.2m thick
- 36 no. 1.5m thick
- 16 no. Tees, 1.2m thick

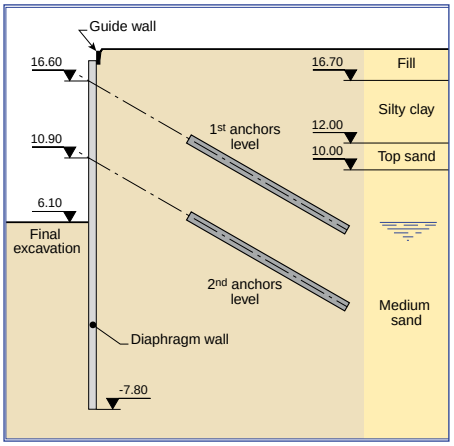
Piles (depth 38m)
- 240 no. 1.2m dia.
- 189 no. 1.0m dia.

Tie-backs
- 164 no. 120t
- 320 no. 90t

Micropiles
- 50 no. 50t



Plan view



Typical section

• Installation of 484 ground anchors in two banks, the second bank 6m below the water table was drilled under pressure.

• Construction of building substructure. The very high loads applied by the towers were transmitted to flat and tee barrette piles, isolated or combined in elements under the cores of the two towers.

The strict construction tolerances on these supports, the fast work rates dictated by the tight schedule and the special geotechnical features meant that the Hydrofraise 4000 had to be assigned. The substructure elements, built from ground level, were 41m deep and concreted over a height of 27m.

The less heavy structures sit on 1.00m and 1.20m bored piles reaching a depth of 38 metres.

Productivity driven by the tight schedule for the foundation works peaked at 800 m^3 per day with as much material to be removed, and three concrete plants allowed the concreting rate to reach 500 m^3 per day.

All the work was fully monitored:
- All diaphragm walling and barrettes were checked for thickness and tilt with Kodesol ultrasound apparatus
- A combination of systematic Kodesol tests and the Enpafraise continuous monitoring system made it possible to meet the stringent verticality requirements in the specifications, limiting tilt to 0.75% at 40m depth.

Several prior loading tests were made on the barrette piles up to 3000t with a tied-back beam reaction system.

North-South view