

Urban excavation

Berlin wall - Shotcrete - Piles - Micropiles - Anchors - Struts - Monitoring

INDUSTRIA - MINERVE

MONACO



Excavation with Berlin-type walls for the construction of 4 residential buildings with 267 parking places

The Administration des Domaines de Monaco awarded the contract for building 4 residential buildings (148 apartments in buildings of 6 to 14 floors) over a surface area of 4,200m², with 267 parking places to the Monaco based SAMEGI property developer. The Solétanche Sam/Alberti Sam consortium was appointed to provide the retaining walls and the excavation and foundation work.



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Excavation work

Constraints

The excavation backs on to a slope, with six-storey buildings founded on spread footings just a few metres away.

These features meant 2 constraints had to be factored into the construction survey:

- No possibility of using the surrounding subsoil to install long anchors
- Very tight restrictions as to allowable deflections on the retaining structure at the party walls (15mm for an excavated height of over 30.00m) of the neighbouring buildings.

CLIENT:	SAMEGI
ARCHITECT:	CURAU ET NOTARI ARCHITECTURAL FIRM
EXTERNAL CHECKER:	APAVE MONACO
GEOTECHNICAL ENGINEER:	ARCADIS
STRUCTURAL ENGINEER:	JM PERISSOL
MAIN CONTRACTOR:	SMETRA
CONSORTIUM LOTS 1 TO 3:	SOLETANCHE SAM / ALBERTI SAM
CONSTRUCTION PERIOD:	SEPTEMBER 2005 - JULY 2008

MAIN WORKS QUANTITIES:

Berlin wall

- 165 micropiles Ø 177.8mm, thickness 20/25mm
- 65 piles Ø 800mm
- Shotcrete thickness. 400mm : 5,100m²
- 383 anchors 5T15 to 10T15
- 48 struts : 63t

Excavations

- Demolition of the INDUSTRIA and MINERVE buildings: 8,100m³
- Earthmoving : 61,000m³ (of which 20,000m³ marl and limestone)

Foundations

- 81 piles Ø 800mm
- 96 piles Ø 1,000mm



Site overview



Construction of working piles in the Plati zone

Design works

The retaining wall varied in height from 8 to 35 m and was built using techniques geared to the different parts of the site:

- Berlin walls with piles of diameter 800mm, reinforced with an HEB 400 beam and connected by a 400mm thick shotcrete wall and temporarily supported by 6 layers of prestressed anchors and angled struts
- Miniberlin walls made up of micropiles (diameter 250mm) reinforced by steel pipes (diameter 177mm, wall thickness 20mm).

A comprehensive system for monitoring the structure itself and the neighbouring structures was established on the site. The system included inclinometers, topographic targets, load cells on the anchors and piezometers.

The Observational Method was applied in order to keep within the previously-established acceptable threshold deflections: measurements were taken at regular intervals and the results correlated to the projected calculations so as to make any adjustments that might be necessary.



Several layers of prestressed anchors and angled struts were used for temporary support for the Berlin wall