

# Soil improvement

Vibrocompaction - Stone columns

## PALM JEBEL ALI - PHASE 1

DUBAI - UNITED ARAB EMIRATES



## Soil improvement works for the palm-shaped artificial island



Aerial view of Palm Jebel Ali in August 2006

The Palm Jebel Ali is the second in the series of three “palm trees” that form an archipelago of artificial islands reclaimed from the sea in Dubai and set out in the shape of a palm tree. This Palm is intended to house residential and tourist complexes, shopping and leisure centres, for a population of approximately 250,000 people. The Vibroflotation Group Ltd, a Solétanche Bachy subsidiary, as part of a joint venture with APCC, was awarded the design and build contract for ground improvement works.

CLIENT:	NAKHEEL
BACKFILL CONTRACTOR:	CHINA RAILWAY ENGINEERING ME
BACKFILL SUBCONTRACTOR:	JAN DE NUL GROUP OF COMPANIES
ROCK WORKS CONTRACTOR:	JAN DE NUL GROUP OF COMPANIES
SOIL IMPROVEMENT CONTRACTOR:	APCC - VFL JOINT VENTURE
DURATION OF WORKS:	18 MONTHS

### WORKS PERFORMED:

- 170,000,000m<sup>3</sup> of backfill
- 10,000,000 tonnes of rocks for the dykes
- 10,000,000m<sup>2</sup> of land created
- 70km of beaches
- Project total surface area: 49km<sup>2</sup>

The site covers 10km<sup>2</sup> of land to be treated, spread over a total area measuring 50km<sup>2</sup>, where most access to the work sites is by sea. This non-standard site mobilized more than 400 people with up to 20 cranes and a series of 36 compaction units (V48 for compacting and V23 for the stone columns).

After backfilling an area contained by rock armour to a thickness of approximately 15m, vibroflotation treatment could commence. This technique, sometimes called vibrocompaction, is used to increase load-bearing capacity, homogenise soil conditions, limit subsidence and differential settlement and eliminate the risk of liquefaction in granular soils.

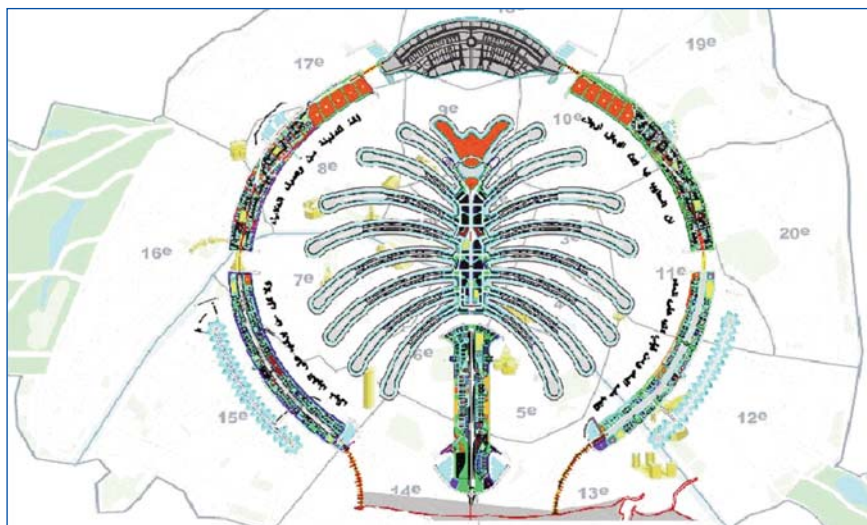
Once this treatment was completed, 60 load-bearing tests, 1,000 test bores and 40,000 CPT (Cone Penetration Tests) were carried out.

**The Ressources**

- 16 cranes in service
- 24 x 500KVA to 1,250KVA generating sets
- 38 compressors
- 50 compaction units
- 18 mechanical loaders
- 2 unloading lighters
- 5 fast transport vessels



*Vibrocompaction tandem unit in action. 15m depth of treatment*



*Palm area compared with that of Paris*

**Our records**

- 22 nationalities present on the project and 10 working languages,
- 34,000m<sup>2</sup> of land worked per day,
- 445,000m<sup>3</sup> of land treated per day,
- 1,120 dynamic cone penetrometer measurements carried out and analysed each week.