

# Project Report

## Vertical drainage

# Cofra

### Project

Quay 16 Container Terminal Extension at the Port of Beirut, Lebanon

### Total Project Scope

122.000 m of drain, 6.138 drains

### Drain type

MebraDrain MD88HD

### Equipment

O&K RH30F Hydraulic excavator  
MZ325 Light drain stitcher, tallest in our fleet



### Period

February 2011 - May 2011



Vertical wick drains can be used for soil stabilization in areas with compressible and water saturated soils. When loads such as road embankments, hydraulic fills or dikes are placed on soft compressible soils, significant settlement may occur and this in turn could create serious problems. MebraDrain installed, evenly spaced, into the depth of the compressible layer, will allow pore water to flow in a horizontal direction to the nearest drain and escape freely, thereby reducing the consolidation period significantly.

### The project

In the Port of Beirut the container terminal is extended with 500 m to the east. Therefore sand will be reclaimed on top of the seabed. In the western part of the reclamation the sand is placed on top of the bedrock. In the eastern area, where the Beirut river eroded the bedrock, the sand will be placed on top of soft clays. This clay has been provided with vertical wick drains of type MebraDrain MD88H. The vertical drains have been installed in offshore conditions from a barge. The waterdepth varied from 4m to 22m. The bottom of the compressible clay layer reached to -50m below waterlevel and is crossed by hard sand layers.

### Equipment

For this project an O&K RH30F has been used with a heavy winch rig, the tallest in our equipment fleet.

### Special requirements equipment

- Automatic drain cutter just above seabed
- Hydraulic driven platform with support casing
- Waterjet system
- GPS-based installation

### Drain configuration

Vertical drainage was installed up to 50m below sea level. The waterdepth varied from 4m to 22m. The average drain length is approximately 20m. The vertical drains are installed in different triangular drainspacings: 2,65m; 3,40m; 3,85m; 4,00m and 4,20m. In total 6.138 drains are installed with a total length of 122.000 m.

