

# Project Report

## Vertical drainage

### Project

Port of Balboa, Panama

### Employer

Panama Ports Company S.A.

### Total project scope

297.000 m of vertical drain

20.374 drains

106.000 m predrilling

10.938 predrilled holes

### Period

March 2013 - July 2013



# Cofra

Prefabricated vertical drains are part of the consolidation process. If loads are applied on clay and peat layers, the poor permeability of the layers can lead to increased pore water pressure. The pore water will gradually flow away and will slowly alter the consolidation. If embankments or other loads are installed too quickly, stability problems will occur. The installed prefabricated vertical drains reduces the consolidation process from decades to months and the increase of the stability is accelerated.

### The project

The Port of Balboa is located at the Pacific entrance of the Panama Canal. The existing container terminal is expanded at the north-west side of the port. The area of extension consists of organic clay with dumped rubble on top. This clay has been provided with prefabricated vertical drains of type MebraDrain MD7007. The rubble layer made predrilling necessary. The Boskalis hopper the Gateway placed the sand surcharge before the drain installation till a level of +10,50 m. The drains are placed through the soft organic clay layer till the bedrock at around -10,00 m.

### Equipment

For the installation of the vertical drain a CAT 385 Hydraulic excavator with a MY 200 EVV drain stitcher was used. For the predrilling a CAT 345 Hydraulic excavator with a M19 drill stitcher was used.

### Drain configuration

The south part of the area has a triangular drain grid of 2,0 m and a consolidation period of 120 days. The north part of the area has a triangular drain grid of 1,5 m and a consolidation period of 90 days. The vertical drains have a depth between 10 and 19 m. Approximately 50% of the drains are predrilled with a depth between 5 and 12 m.

### Review

The drains have been installed in a satisfying way within the time of completion. The drain and predrill depths were determined in close consultation with Employers Engineer and were recorded with a datalogger.

