

Cofra



vertical drainage

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Building worldwide on our strength



© MebraDrain *vertical drainage*

Cofra is a proven partner in the field of civil engineering for the installation of innovative ground improvement products. Being able to respond proactively to customers' requests, in some cases with equipment developed in-house, makes Cofra a prominent market leader and contractor with an international customer base. Cofra has international establishments (depots/outlets) from which equipment can be shipped to projects all over the world. Years of experience, in-depth knowledge and many successful projects ensure that Cofra is a contractor that is in great demand and a market leader in the installation of ground improvement products.



The ground level after the installation of vertical drainage



GPS logger

The technology

Vertical drainage has been in use in its current form since the 1970s. Vertical drains are used to considerably reduce construction time. Over the years, the installation technique has improved to the extent that Cofra has installed millions of metres of drain per year and can often be found working on the largest and most challenging projects.

Why vertical drainage?

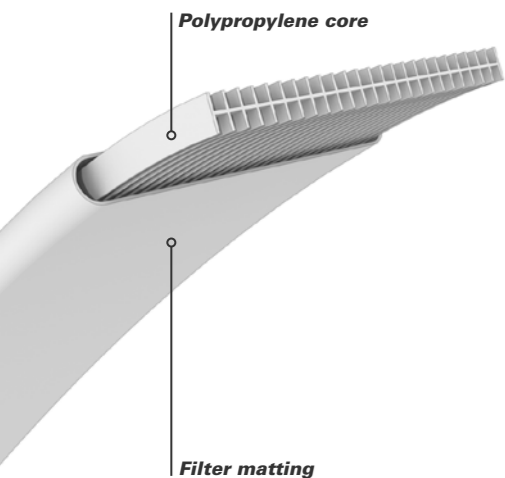
If loads are applied on clay and peat layers, the poor permeability of the layers can lead to excess pore water pressures. If no measures are taken, this excess pore water gradually dissipates and a slow and continuous settlement is measured. This also gives rise to possible stability problems if embankment construction takes place too quickly. Cofra's MebraDrain system consists of a plastic strip drain that is installed vertically from ground level down to the desired depth. This creates vertical drainage paths in the subsoil, considerably reducing the flow path of the excess pore water. As a result, the consolidation process can be reduced from decades to six months or less and the stability is increased, meaning that embankment construction can take place more quickly.

Installation

The vertical drainage is installed by Cofra using patented stitchers developed in-house and constructed exclusively for Cofra. Using this stitcher a steel profile (mandrel) containing the drain is inserted. This lance is moved up and down by a system of cylinders or winches driven by the hydraulics of the hydrolic excavator. The drain that protrudes from the underside of the lance is attached to an anchor plate. This anchor plate ensures the sealing of the lance so that soil cannot get inside during the installation process. It also



Installation of the infrastructure with the aid of vertical drainage on the Second Coen Tunnel project, Amsterdam, The Netherlands



Polypropylene core

Filter matting

takes the drain down to the desired depth. When the lance reaches the desired depth the lance is retracted. Due to the resistance experienced by the anchor plate when the lance is retracted, this anchor plate – and thus also the underside of the drain – remains at the desired depth. After the lance has returned above ground, the drain is cut off and a new anchor plate is fastened to the underside of the next drain.

Applications of vertical drainage include:

- > Preparation of residential districts for construction
- > Installation of infrastructure (roads, railways, ports and airports)
- > Installation of dikes
- > Land reclamation projects



Installation of vertical drainage in the Weststrandweg project, Halfweg, The Netherlands

Advantages of vertical drainage:

- > Little disruption of the various soil layers
- > Guaranteed water drainage, even in the case of high soil pressure and deformation
- > Possible adaptation of the core and filter matting to the soil properties
- > Short consolidation period thanks to the use of small drain spacing
- > Quick installation: on average 8,000 metres per day, per machine
- > No water necessary during installation
- > Installation to a drain depth of 65 m
- > Installation checked with the aid of a drain logger
- > Clean implementation, no waste soil is generated



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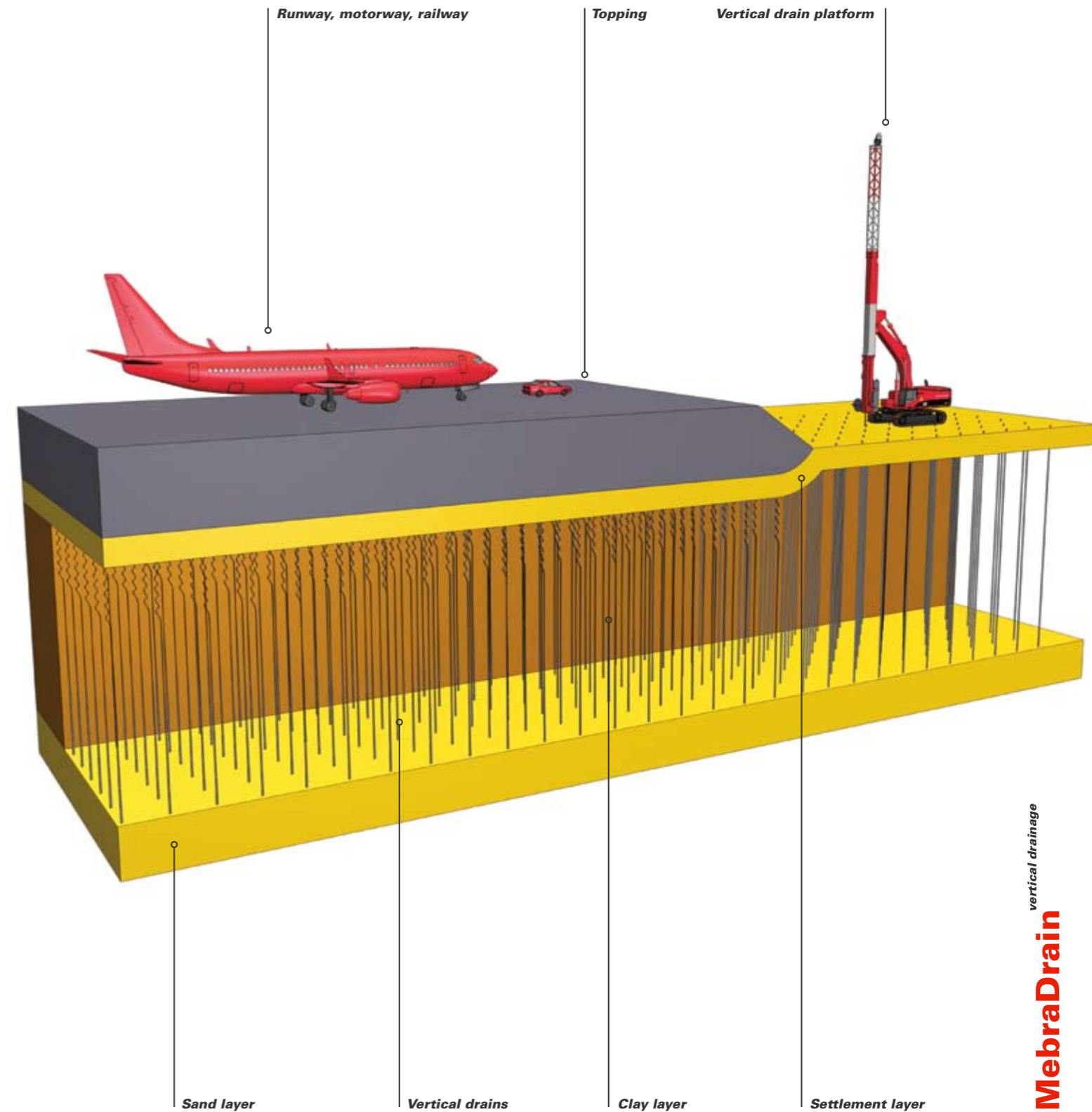
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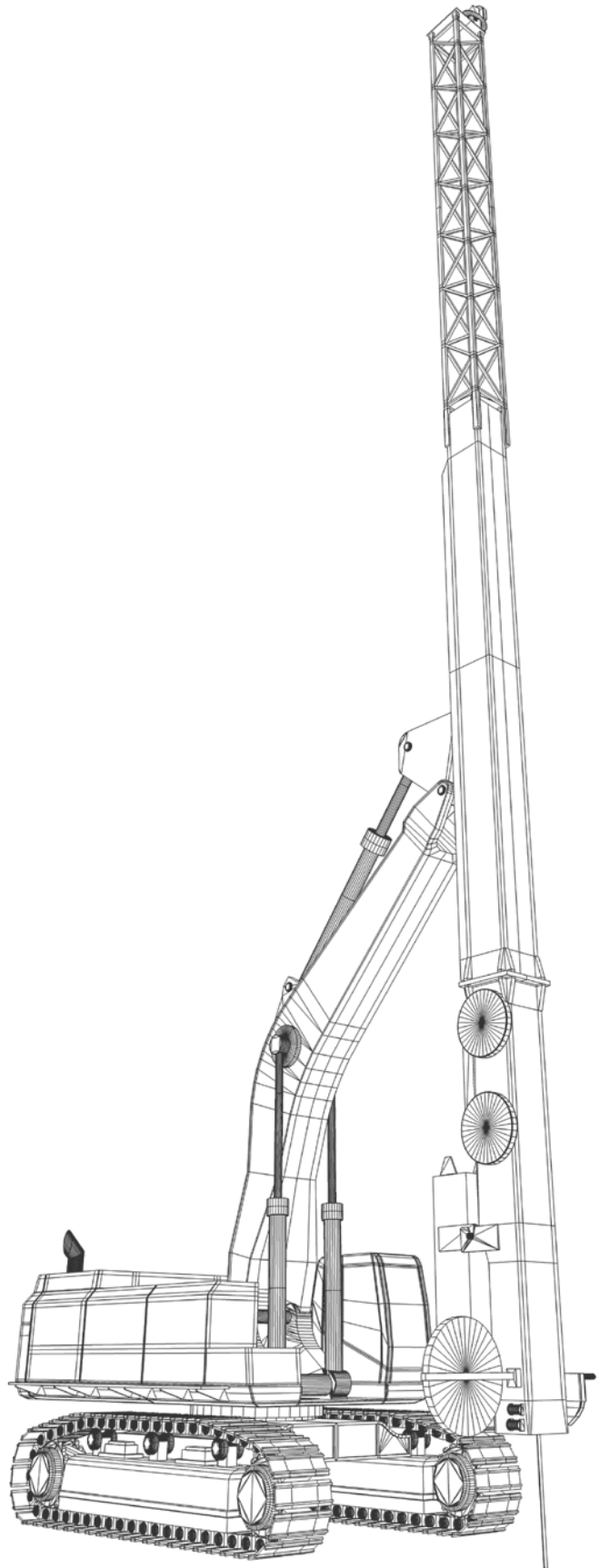
Cofra B.V. is an innovative contractor specialising in ground improvement techniques and membrane construction. Quality is everything to us and thanks to our high level of experience and expertise we can provide the entire process from design to implementation all under one roof. Cofra, and, its sister company Geotechnics, is part of the internationally operating company Royal Boskalis Westminster. Cofra is active in specific sectors of civil engineering, ground improvement techniques and geotechnical hydraulic and gas barriers. Cofra is always working on the development of new ground improvement techniques.

Other Cofra techniques:

- > AuGeo
- > Geolock
- > BeauDrain-S
- > HDPE
- > CDC

You can find further information about vertical drainage and other techniques from Cofra on our website www.cofra.com.





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T +31 (0)20 693 45 96, F +31 (0)20 694 14 57
www.cofra.com, mail@cofra.com
Cofra BV, P.O. Box 20694, 1001 NR Amsterdam
The Netherlands

Amsterdam
Stockholm
Bratislava
Singapore