CONSOLIDATION

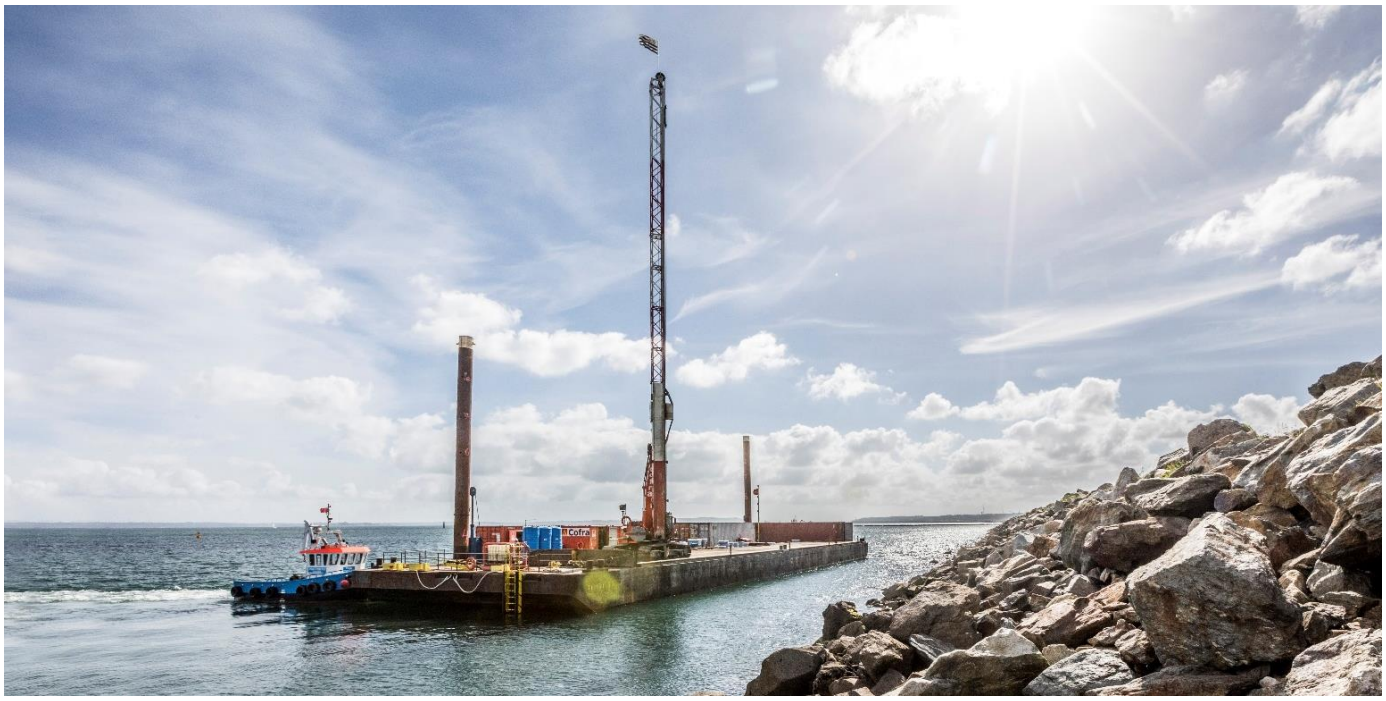
Ground Improvement

Consolidation

Peaty, clayey and sometimes even silty soils are characterized by a high-water content, very low permeability and a low strength. When loads are applied to these soils, excess pore water pressure develops as the soil cannot adjust to the new load due to the very low permeability and slow dissipation of the excess pore water. With the dissipation of the excess pore pressures the soil adjusts to the new load. This often results in long periods (years) with high consolidation settlements and a low to insufficient safety factor on the stability of the embankment. With the application of low cost prefabricated vertical drains (PVD) a considerable reduction of the consolidation / settlement time, from years to months, and a major improvement in the stability of the embankment can be achieved. When surcharge is used, residual settlements can be controlled. The use of PVD with surcharge is therefore one of the most commonly used techniques and often the cheapest method to prepare soft compressible subsoil for future construction activities. Cofra has several consolidation systems within its portfolio.

Our solutions

- Vertical Drainage
- Vacuum Consolidation
  (liner, BeauDrain, BeauDrain-S)
- Earthquake drains



Cofra
Cofra is an innovative contractor specializing in ground improvement techniques and membrane constructions. Innovation, professionalism and customer focus are embedded in our DNA. Thanks to our high level of experience and expertise we can provide in house the entire process from design to implementation. All based on the Cofra 'Way of working' in which quality and safety are key values. Cofra, as well as sister company Geotechnics, joined in 2006 Royal Boskalis Westminster, leading dredging and marine experts. Cofra's markets are infrastructure, dredging, mining, construction, waste management, flood protection, environmental and warehousing.

For further information about the consolidation segment and other Cofra techniques see our website

www.cofra.com

SEGMENT	CONSOLIDATION	COMPACTION	ELEMENTS	BARRIERS
PURPOSE	- Accelerate settlement - Increase strength of subsoil - Reduce residual settlement	- Increase density - Increase bearing capacity - Increase safety against liquefaction	- Transfer load to bearing strata - Increase bearing capacity - Increase safety against liquefaction - Reduce residual settlements	- Obstruct waterflow - Obstruct sediment erosion - Non-structural elements - Prevent spreading polution
ACTIVITIES	- Prefabricated Vertical Drains (PVD) - Vacuum Consolidation (BeauDrain)	- Cofra high impact Roller Compaction (CRC) - Cofra Dynamic Compaction (CDC) - Dynamic Compaction (DC) - Cofra Vibro Compaction (CVC)	- Geotextile Encased Columns (GEC) - Cofra Stone Columns (CSC) - Dynamic Replacement (DR) - Concrete columns (AuGeo)	- HDPE vertical barrier (up to 30m depth) (Geolock) - Vertical Sand Barrier (anti piping) (VZG) - Trenched MIP walls - Trenched liner barrier (up to 5m depth) - Liners
MARKETS	- Infra (roads, railroads, airports, ports) - Dredging (Reclamations, breakwaters) - Mining (Tailing ponds) - Construction (Housing and industrial estates)	- Infra (roads, railroads, airports, ports) - Dredging (Reclamations, breakwaters) - Mining (roads, remediation) - Construction (Housing and industrial estates)	- Infra (roads, railroads, airports, ports) - Dredging (Reclamations, breakwaters) - Construction (Housing and industrial estates)	- Waste management (landfills) - Mining (Tailing ponds) - Infra (Aquaducts) - Flood protection (anti piping) - Environmental