BeauDrain-S

Project report

Bremerhaven, Germany

The system
BeauDrain-S is a recently developed, patented system to accelerate the consolidation process of highly compressible, cohesive soils. Its principles are based on those of the traditional vacuum consolidation.

By creating a vacuum in the soil mass, the atmospheric pressure is mobilized as a temporary surcharge. In addition, the length of the drainage path of the pore water is reduced by the installation of vertical drains.

During the installation of the system, a modified drain stitcher installs a predefined length of prefabricated vertical drain (pvd) connected to the bottom of a tube. To ensure an airtight system, the top of the pvd must be buried in the soft, compressible layers. This is usually at a depth of 1m below the groundwater table or at the boundary with the permeable layers. After installation, only the tube is present at the surface, where it is connected to a special pump. The hole produced by the mandrel of the drain stitcher closes in on itself or will be plugged with clay. After starting the pump, the upper meter of the cohesive strata will act as a seal allowing a vacuum to develop in the compressible soil mass. After a check of the system a sand fill or an additional surcharge can be placed over the area to be consolidated.

The project
In Bremerhaven the client “Bremerport”, had a problem with a basin filled with fine dredged material. This basin had to be consolidated for the use of a new car terminal.

The BeauDrain-S was installed from a pontoon because of the depth and instability of the material to be treated. Total area to be treated was about 62,000 m², to the depth of 18 m below water level. After the water was pumped away, several drains were coupled and the embankment of sand was placed on top of the treated area. In total 26 pumps were placed for a period of 9 months to make sure the system retained vacuum. In total 2.5 till 3.0 meters settlement was achieved.

Equipment
In total 900,000 meters of MD88-H were installed on this project, using a LH944 and a Hitachi 355. The stitchers were equipped with a winch to pull the BeauDrain into the stitcher.