BeauDrain-S

Project report

Suvarnabhumi airport, Bangkok

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
Due to the limited capacity of Don Muang Airport, Thai authorities decided to build a new international airport; Suvarnabhumi airport. For this project, 19 different areas varying from 4.500m² to 88.000m² (total 400,000m²) required ground improvement. The client requested a consolidation degree of 60% within 100 to 120 days with a surcharge of 2.8 meters and an atmospheric pressure of 60 kPa in the drain on a depth of 5 meters.

Equipment
Because of the short period of consolidation and the size of the areas to be consolidated, a maximum of eleven 40-tonnes cranes were used during the installation of the BeauDrain-S Drain.

Drain configuration
The drains were installed up to a depth of 10 meters - MSL with a triangular centre to centre distance of 0.85 and 0.90 meters.

Review
The BeauDrain-S system has been chosen for this project in order to reduce the influence on the surrounding areas and to shorten the consolidation period. Because of the extremely soft clay in the soil, horizontal deformation was minimized by applying BeauDrain-S.