The method - MebraDrain

Vertical wick drains can be used for soil stabilization in areas with compressible and water saturated soils. When loads such as road embankments, hydraulic fills or dikes are placed on soft compressible soils, significant settlement may occur and this in turn could create serious problems. MebraDrain installed, evenly spaced, into the depth of the compressible layer, will allow pore water to flow in a horizontal direction to the nearest drain and escape freely, thereby reducing the consolidation period significantly.

The method - BeauDrain-S

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 air-tight 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

The Port of Brisbane Company (PBC) has planned to expand their harbour facilities in the Moreton Bay at the Fishermans Islands which are originally mangrove islands. The greater part of the old islands has already been developed through a simple way of land reclamation.

A new phase in reclamation has now been appointed as Future Port Expansion (FPE) and comprises the enclosed area of approximately 230 hectares sub-tidal lands. Ground improvement works were necessary within FPE at the future Paddocks J2, S3A and B and Terminal 11. In total 1,000,000 m1 of vertical drainage type MD7007 and 400,000 m1 of type MD88H were installed. For the Beaudrain –S- area, 200,000 m1 of vertical drainage type MD88HD and 50,000 m1 of tyleen hose was required.

Equipment

For this project Cofra mobilized the following equipment. A RH30F excavator together with a heavy winch rig. For the Beaudrain –S- system an on site drain pre fabrication unit was set up to attach the tyleen hoses to the vertical drainage. To get a vacuum on the Beaudrain –S- system several Betsy pumps were operational for months.

Drain configuration

The drain spacing for this project was 1.25 meter and the depths varied between 15 and 30 meter below working surface.

Review

In both the Beaudrain –S- area as well as all the areas where Mebra-drain was installed all drainage works have been executed satisfactory according design to ensure all future rest settlements are brought to a minimum.