CASE KIVIKONLAITA

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Kivikonlaita, Helsinki, Finland
Construction of an industrial area on a swamp

Key words: Mass stabilization, Peat, Clay, Swamp, Test embankment

General information
The industrial area of Kivikonlaita in Helsinki is located in the Tattarisuo swamp area. The first stabilizations were done 1998-2000 as a part of peat mass stabilization development projects EuroSoilStab (ESS) and “Stabilization development project” (SKP). Functionality and feasibility of both mass and column stabilization were examined as a combined structure. The combined structure was found to be too expensive to stabilise the whole 9 hectares area of Kivikonlaita. After the development projects all stabilizations were mass stabilizations, except one column stabilised area.

Advantages of stabilization
There were two major reasons to stabilise the swamp in Kivikonlaita. The main reason was to improve the bearing capacity and stability and reduce settlements in a cost-effective way. The other reason was to develop and gather knowledge from the stabilization methods.

Project timetable
Stabilizations in Kivikonlaita were as following:
Mass stabilization in years 1998 – 2004 and 2007-2009->
Column stabilization in 2006

Volumes and dimensions
Approx. 9 hectares was stabilised

Geology and stabilized material
From top to bottom: 2-3 m peat layer (w=400-1000 %), 4.5-9.5 m muddy clay (w=150 %) / clay layer (w=35-80 %)

Target strength of the stabilized material
Mass stabilizations: ESS: 40-100 kPa, SKP: 40-50 kPa, all the rest mass stabilizations 40 kPa

Binder(s)
Mass stabilizations - ESS: Finnstabi + cement (70-113+70-113); SKP: cement (100) / sand + cement (150+100); Others: mostly sand + cement (150+100)

Laboratory and field tests
In the development projects ESS and SKP there was a lot of instrumentation, measurements and laboratory tests (e.g. settlement plates, inclinometer, piezometer, earth pressure and temperature sensors). There were/are settlement plates and ground water pipes also in other areas.

Other

Long-term follow-up and lessons learned
Quality control soundings were performed in mass stabilised areas ESS, 1 ha -alue, Urakka-alue 4 and Alue C in 2017 to estimate the long-term strength development. It appeared that the strength had increased significantly from the previous measurements.

Sources

Stabilization contractor
Various contractors (e.g. Biomaa, Niska & Nyssönen, YIT, Skanska)
Stabilised areas and stabilization years in Kivikonlaita.

Principle of mass stabilization cross sections after the development projects.

First mass stabilizations in Kivikonlaita – effect of stabilization