

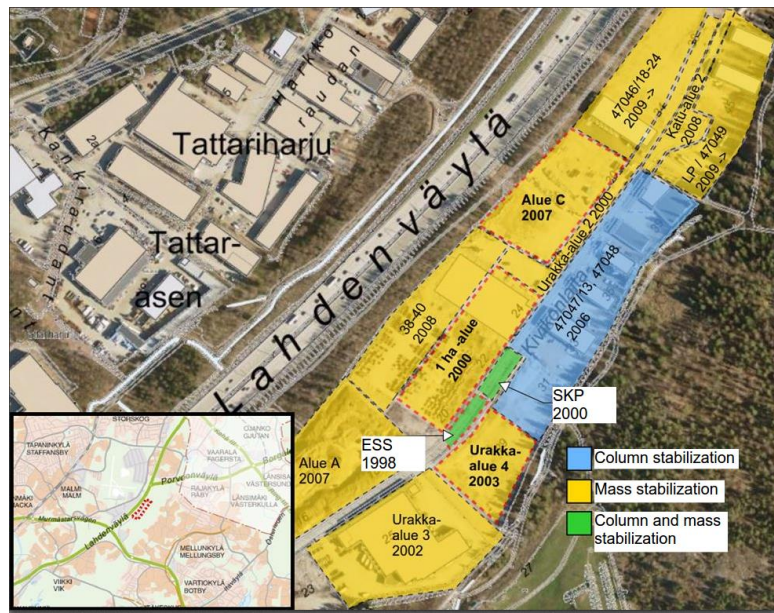
## CASE KIVIKONLAITA

| <b>KIVIKONLAITA</b>   | Key words:   |
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| Kivikonlaita, Helsinki, Finland<br>Construction of an industrial area on<br>a swamp | Mass stabilization, Peat, Clay,<br>Swamp, Test embankment  |
| <b>General information</b>  | 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. |
| <b>Advantages of stabilization</b>  | 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.  |
| <b>Project timetable</b>  | Stabilizations in Kivikonlaita were as following:<br>Mass stabilization in years 1998 – 2004 and 2007-2009-><br>Column stabilization in 2006   |
| <b>Volumes and dimensions</b>   | Approx. 9 hectares was stabilised  |
| <b>Geology and stabilized material</b>  | 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 %)   |
| <b>Target strength of the stabilized material</b>                                   | Mass stabilizations: ESS: 40-100 kPa, SKP: 40-50 kPa, all the rest mass stabilizations 40 kPa  |
| <b>Binder(s)</b>  | Mass stabilizations - ESS: Finnstabi + cement (70-113+70-113); SKP: cement (100) / sand + cement (150+100); Others: mostly sand + cement (150+100)   |
| <b>Laboratory and field tests</b>   | 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.   |
| <b>Other</b>  | -  |
| <b>Long-term follow-up and lessons learned</b>                                      | 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.  |
| <b>Sources</b>  | Hautalahti, P., Halkola, H. ja Puumalainen, N. 2007. <i>Kivikon teollisuusalueen stabi-loinnin koerakentaminen</i> . Geotekninen osasto julkaisu 92. Helsingin kaupunki, Kiinteistövirasto.<br>Piispanen, P. Forsman, J., Melander, M. & Winqvist, F. 2017. <i>Kivikonlaita ja Tattarisuo, Helsinki: Massastabiloinnin pitkäaikaistoimivuus</i> . Research report, Ramboll Finland Oy. Helsingin Kaupunki. (draft 11.9.2017)   |
| <b>Stabilization contractor</b>   | Various contractors (e.g. Biomaa, Niska & Nyssönen, YIT, Skanska)  |

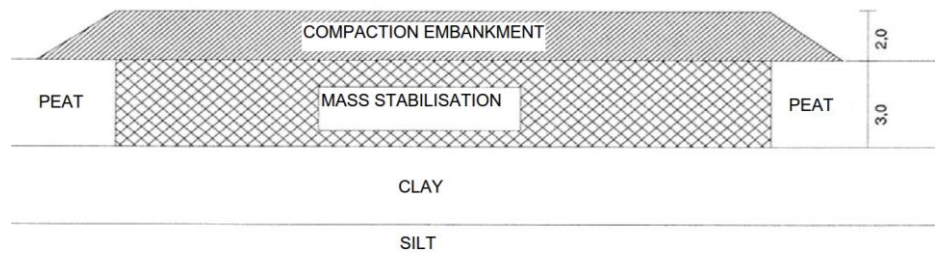


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Stabilised areas and stabilization years in Kivikonlaita.



Principle of mass stabilization cross sections after the development projects.



First mass stabilizations in Kivikonlaita – effect of stabilization

