Development of Mass Stabilisation Technique for Contaminated Sediments

SEDNET, Oslo

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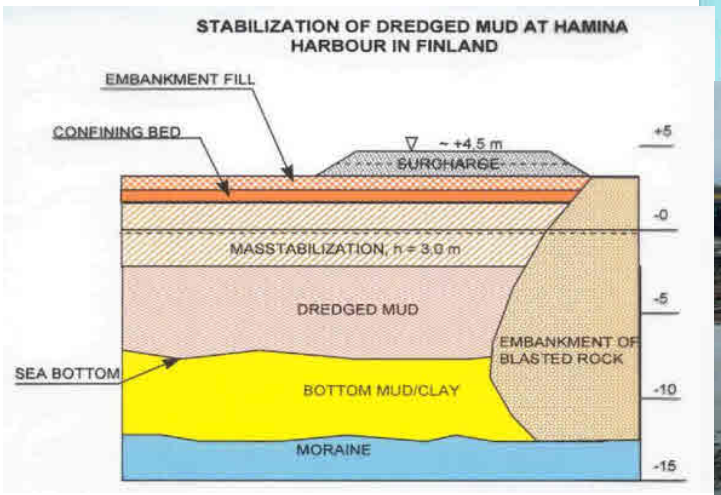
RAMBØLL

History. The beginning

Mass stabilisation in Veittostensuo 1993

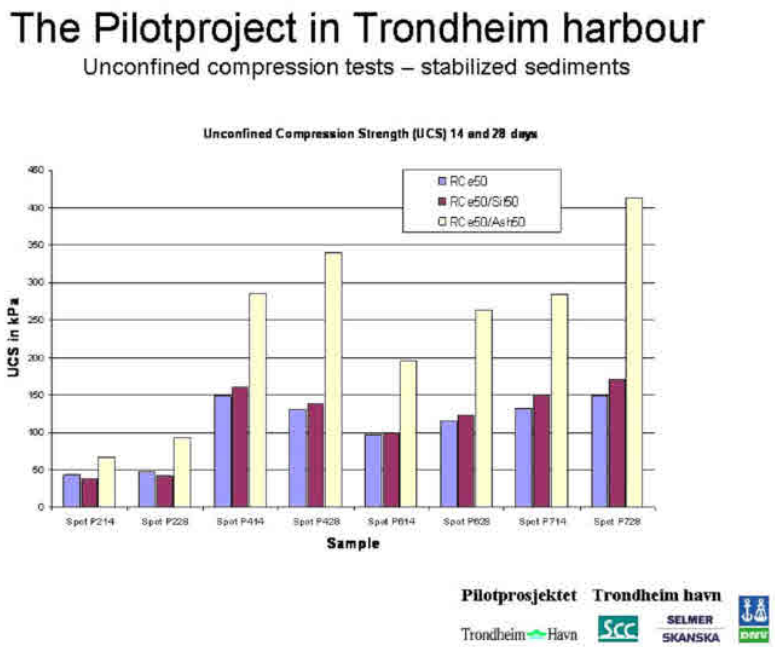
Mass stabilisation of dredged materials in Hamina Harbour 1996



Sörnäinen Strand in Helsinki 1998

Cross section of the coast structure

The pilot project in Trondheim Harbour



New Harbour in Vuosaari 2008, Helsinki

Vuosaari Harbour, Mass stabilization of TBT-sediment, 2005-2006

The Importance of Laboratory Tests

Stabilizers:

- **Lime**
- **Cement**
- **Lime-cement**
- **Aggregates**
- **Industrial by-products (fly ash, blast furnace slag, FGD-residue etc.)**

Technical, economical and environmental optimizing by careful binder tailoring

Binder technology

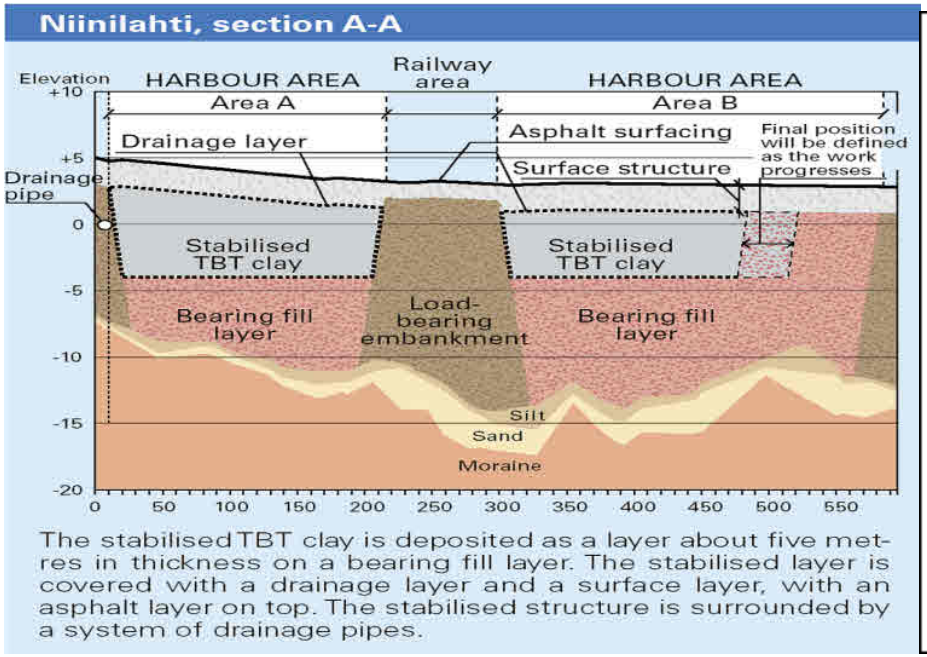


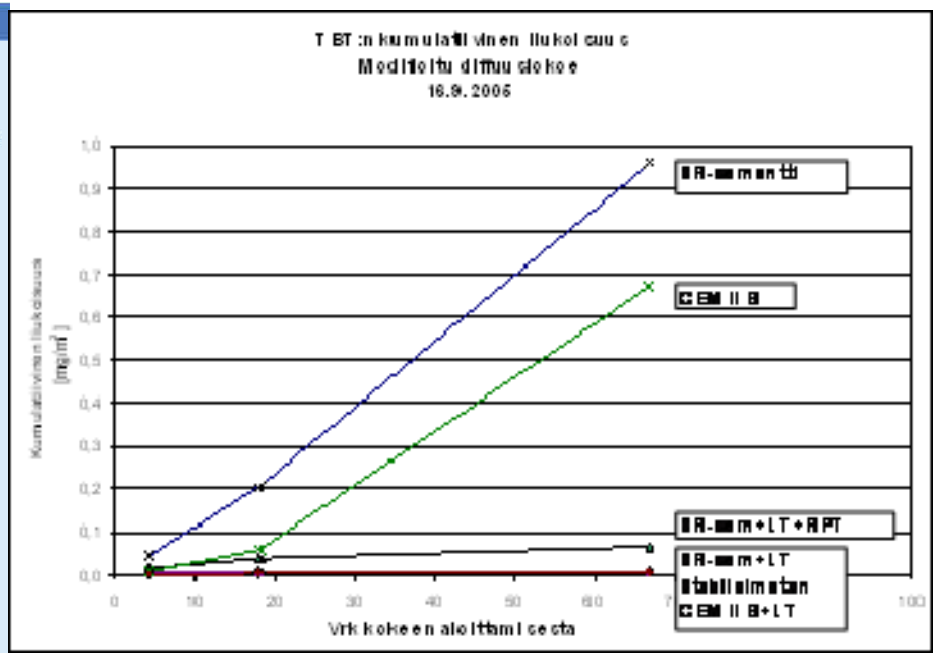




Binders to be used shall be tested beforehand in laboratory (and in field)

Vuosaari Harbour, Mass stabilization of TBT-sediment, 2005-2006



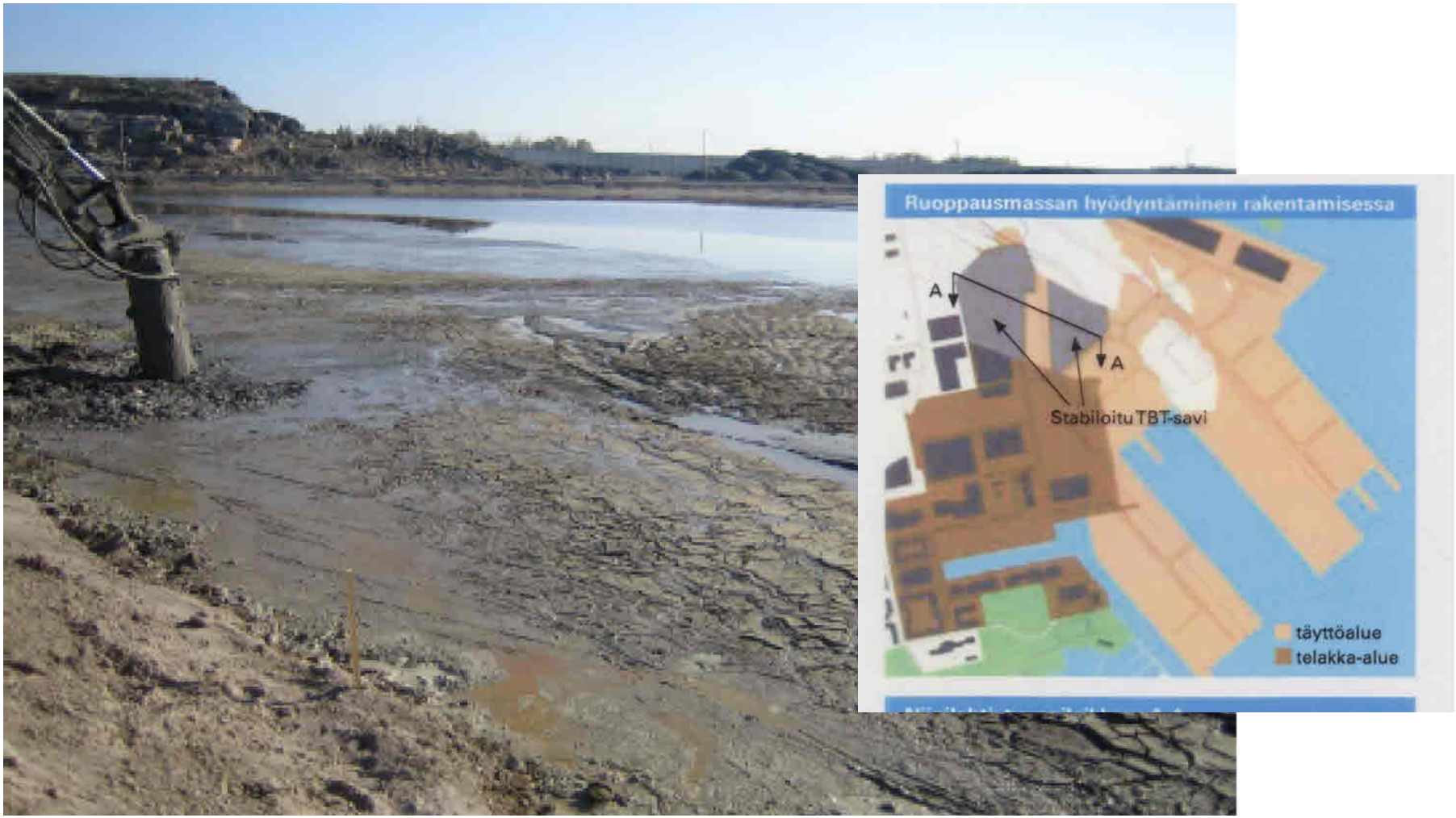


Vuosaari Harbour, Mass stabilization of TBT-sediment, 2005-2006

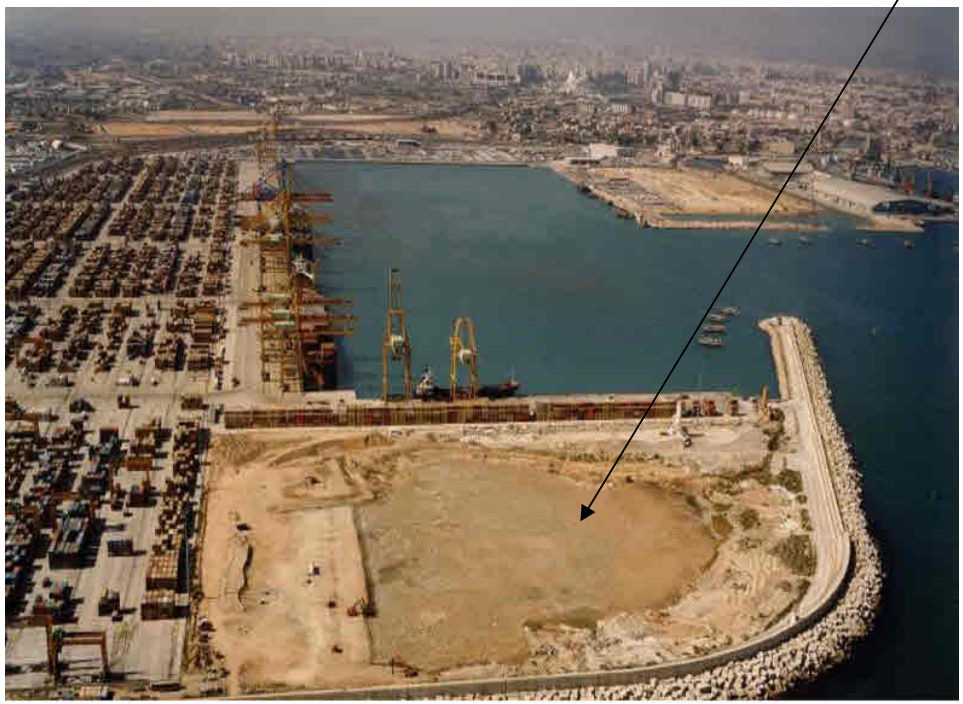
The biggest mass stabilization project in Finland until 2006

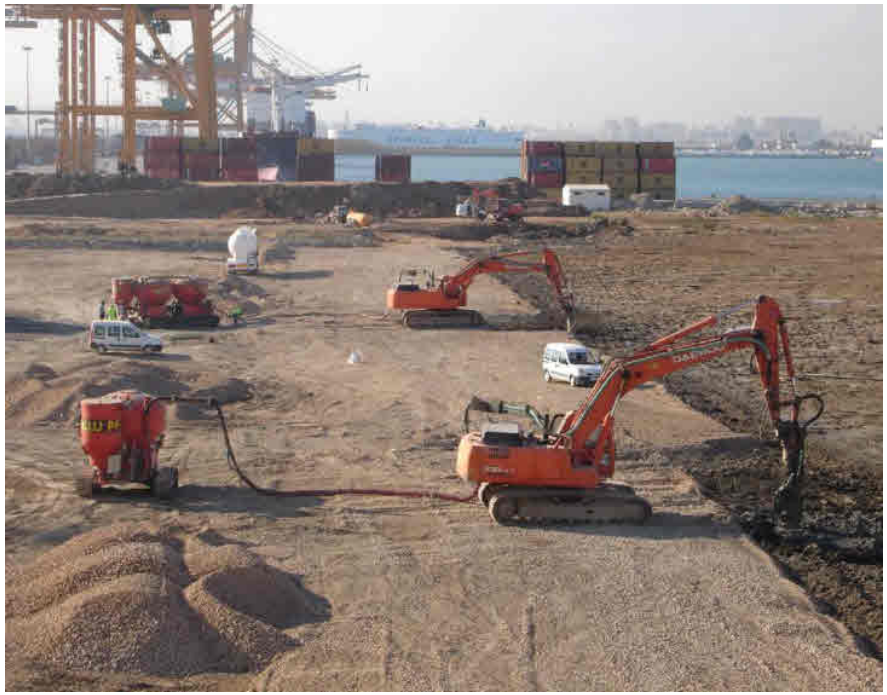
Total area ~ 11 hectars
Mean depth was 5 m
Total volume ~ 500 000 m3
Binding agent was cement by Finnsement (CEM II/A-M (S-LL) 42,5 N); 135 kg/sediment-m3; total ~ 70 000 tons

Vuosaari Harbour, Mass stabilization of TBT-sediment, 2005-2006

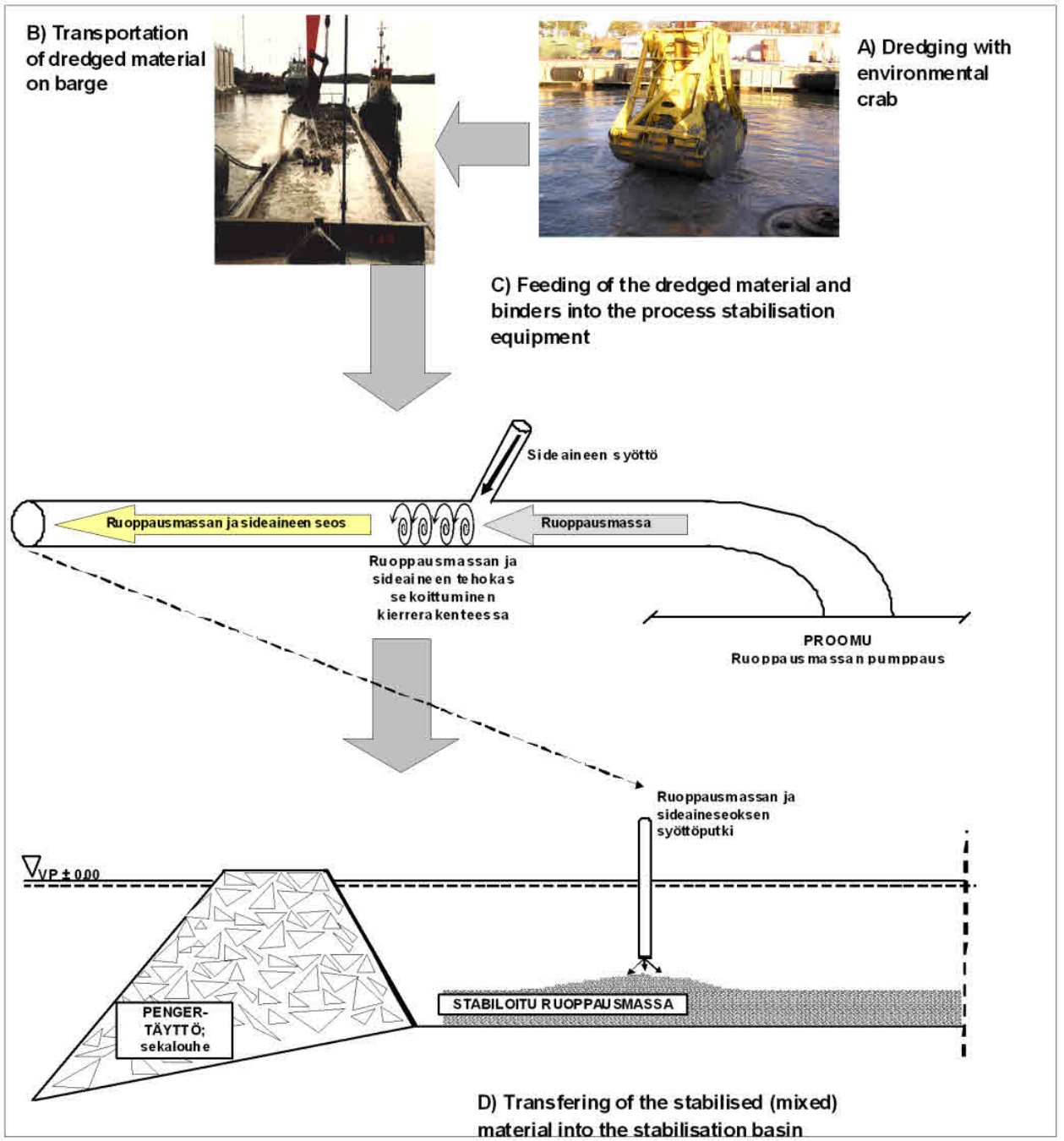


Valencia in Spain 2005, Mass stabilisation for a container area is ongoing, area of 5 ha





EU-Life Stable project in Turku Harbour



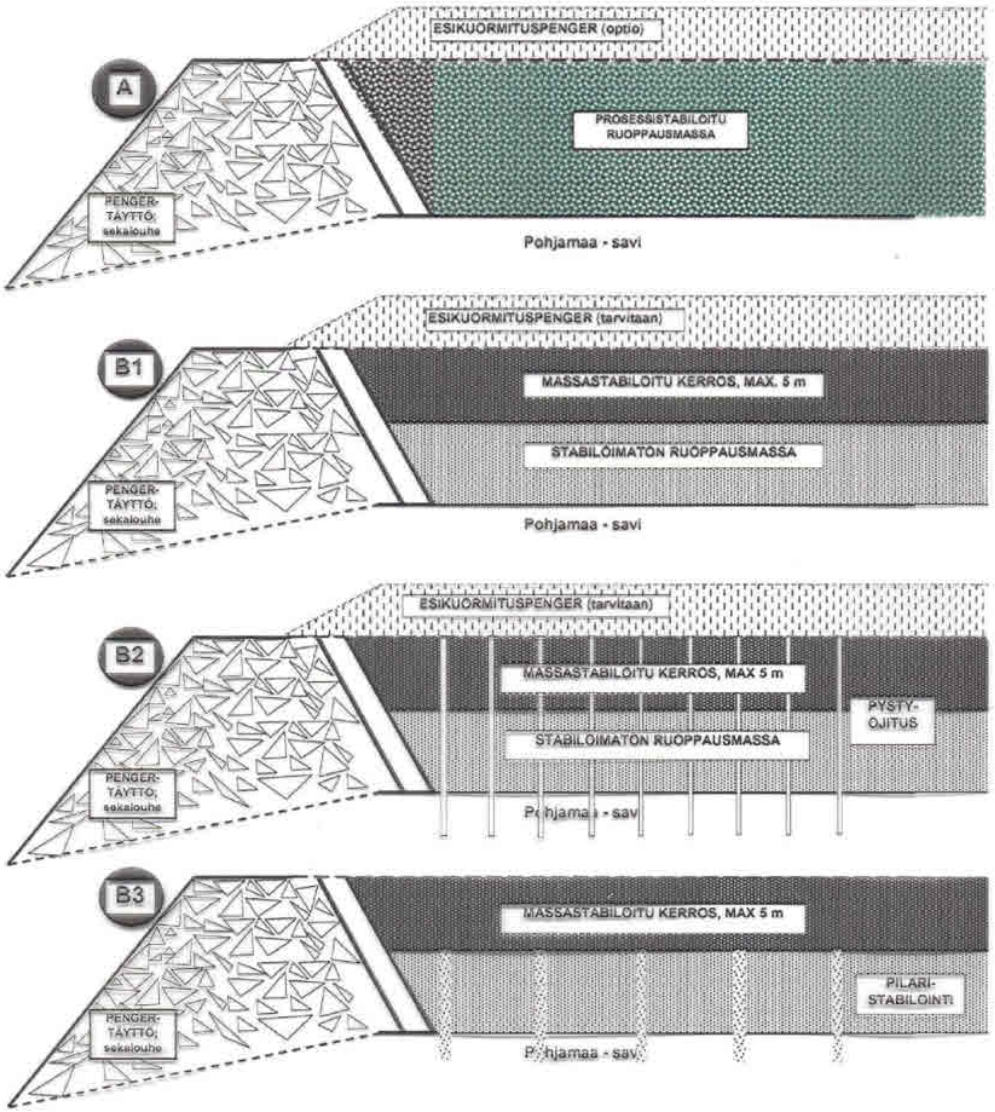
Various applications of mass stabilisation filling constructions

A. Total process stabilisation

B1 Mass stabilisation on the top, max. 6,0 m

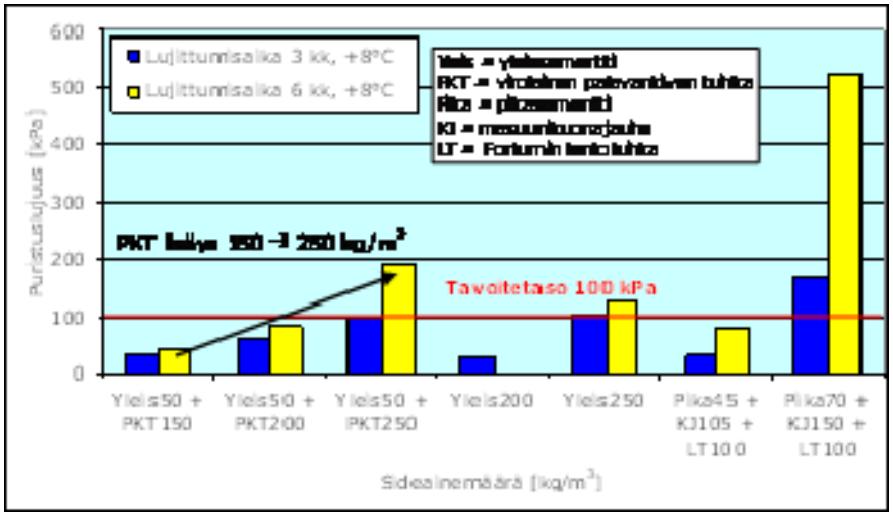
B2 Mass stabilisation and vertical drainage

B3 Mass stabilisation and column stabilisation



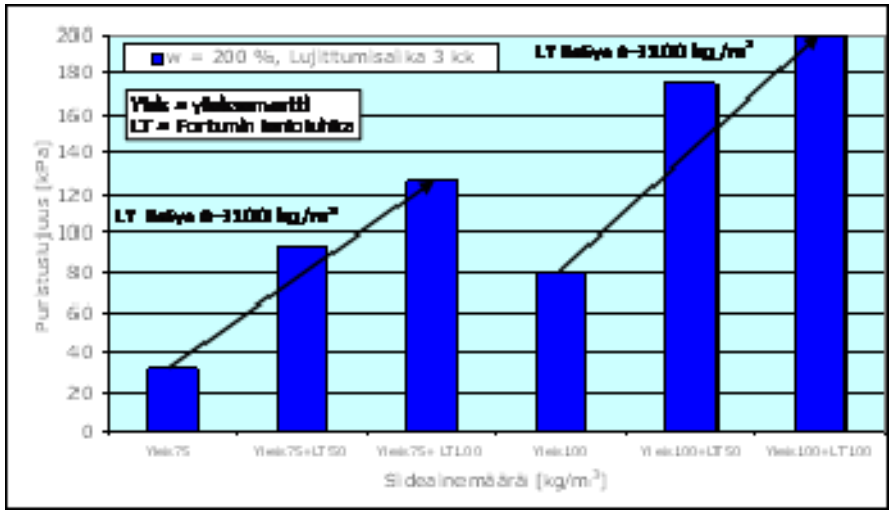
Stabilisation tests, industrial by-products as binders

Sediment of Aurajoki river



It is very effective and economical to use industrial by-products. In Aurajoki case, the most effective by-products together with cement are coal fly ash plus furnice slag and oil shale ash.

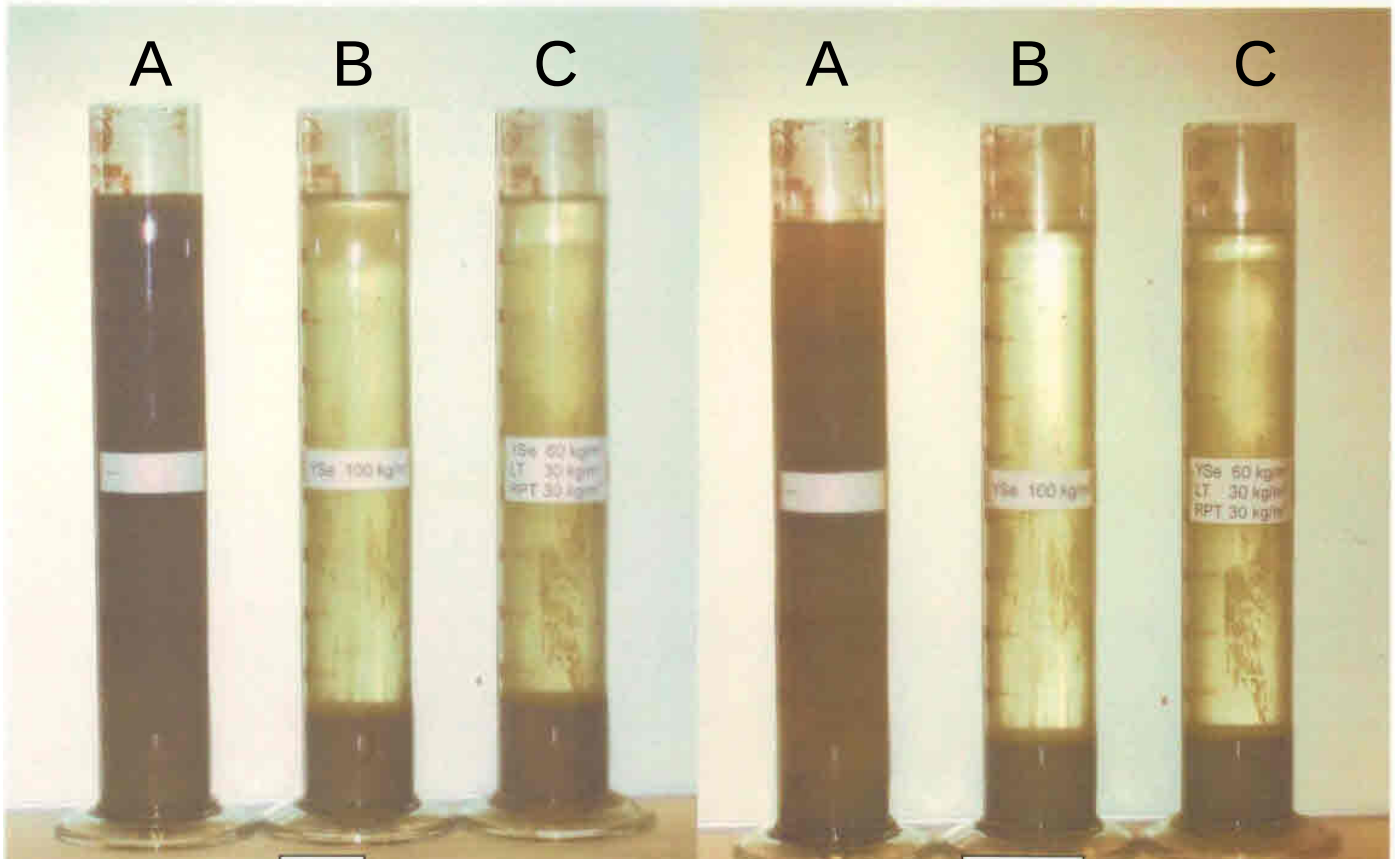
Sediment of Perno fairway



In Perno case, utilisation of coal fly ash is very effective and economical.

By using industrial by-products, the amount of cement can be reduced from 250 kg/^{m3} to 50 kg/^{m3}.

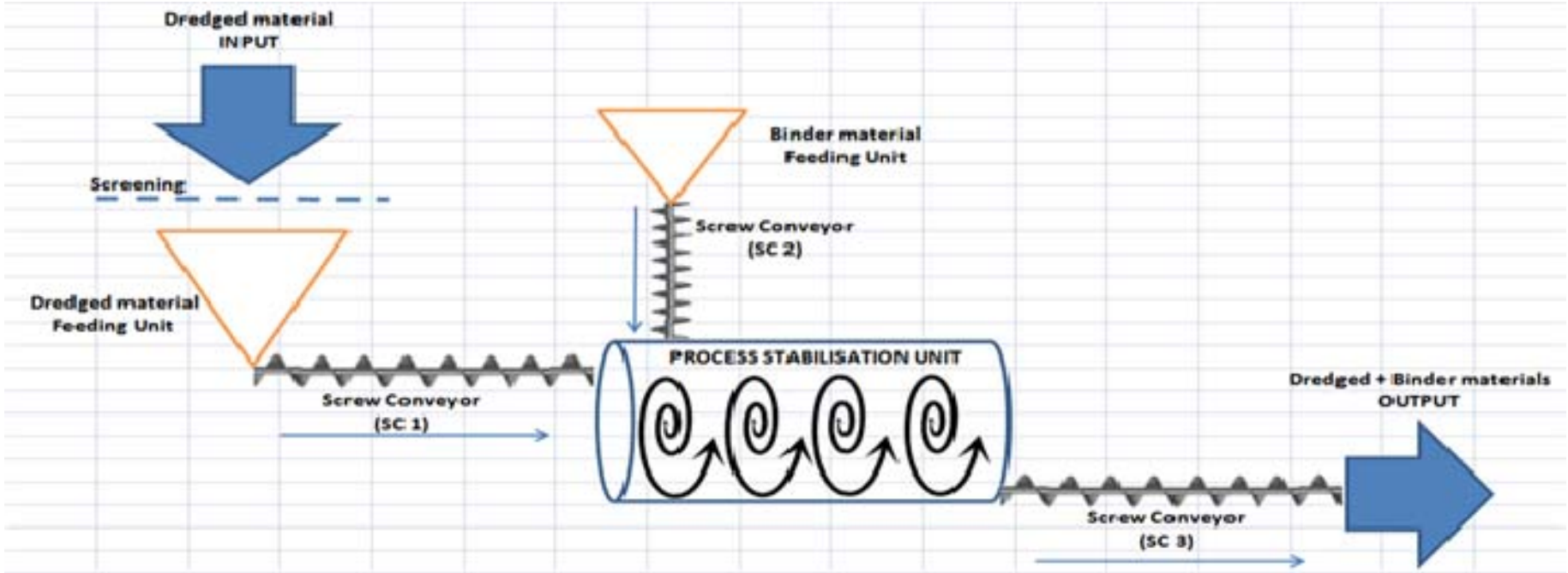
Laboratory tests of sediments with high water content



1 hour **5 days**

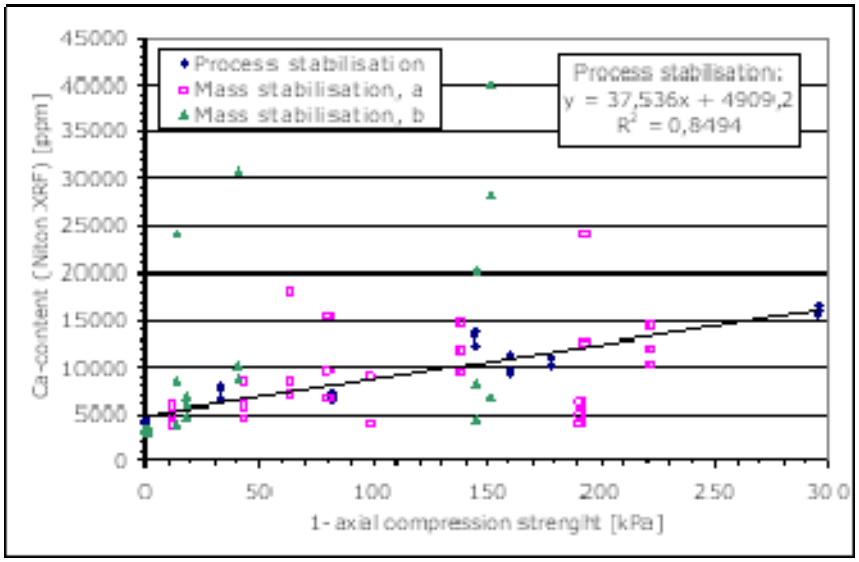
A = sediment without binder B and C = mixtures with various types of binders

The principle of process stabilisation



EU-Life Stable project in Turku Harbour

Prototype of the equipment for process stabilistation



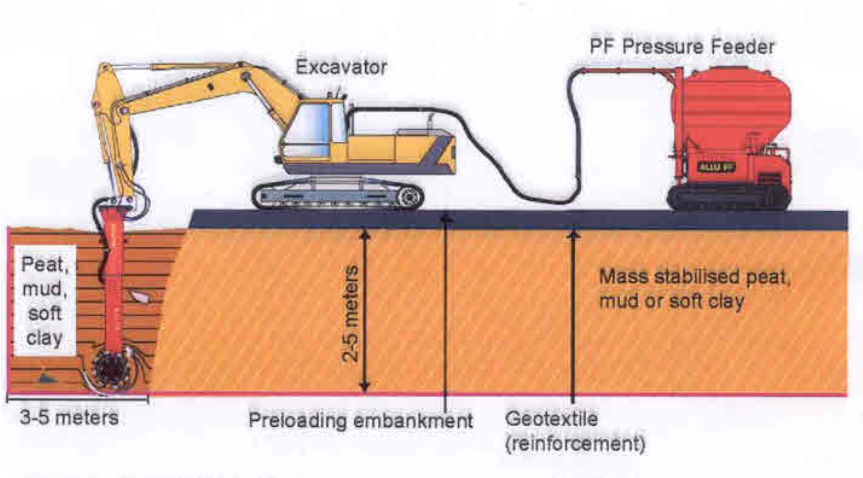
The homogenity of mass stabilisation compared to process stabilisation

Mass stabilistation in the barge

Treatment equipments

Process stabilisation

Mass stabilisation



Stack mixer

Mass stabilization- Main purposes

- Increase soil strength
- Improve deformation properties
- Remediate contaminated soil
- Save costs (transportation of masses etc)
- Save disposal areas
- Save natural aggregates and rock ballast