

Researchers develop permeable pavements for Nordic conditions

14 January 2015, by Olli Ernvall

In co-operation with industrial partners, VTT Technical Research Centre of Finland Ltd has developed permeable pavements to reduce the problems caused by storm and runoff water in urban areas. The project also aims to prepare for the higher volumes of rainfall and more intense storms that can be expected in the future. The pavement solutions developed in the project are well suited for areas with low traffic volume, such as car parks, pavements, courtyards, fields and squares. The first Finnish pilots of the surfacing layers will take place in the cities of Espoo, Helsinki, Vantaa and Oulu in the spring of 2015.

The recently completed CLASS (CLimate Adaptive SurfaceS) project that spans two years developed permeable pavement solutions for Nordic conditions with a materially different approach than traditional pavement layers and structures. Suitable materials include pervious concrete, porous asphalt and concrete and natural stone block paver systems where the material used in the joints or openings allows high water infiltration.

The permeable pavement consists of a surfacing layer and sub-surfacing materials with high porosity that can retain water. Other materials, products and structures can also be incorporated, such as drainage and water collection systems, geotextiles and geomembranes.

"The pavement solutions developed in the project can help in mitigating urban flooding caused by large volumes of water entering the stormwater network," says VTT's Project Manager Erika Holt.

In the Nordic countries, it is important to consider the freeze-thaw durability of materials, as well as their behaviour in cold weather conditions. The project team focused on material performance in the subarctic climate, where infrastructures are subject to freezing and thawing ground frost as well as de-icing salt and sanding.

Water infiltration capacity and winter durability performance was verified for the full service life of the pavement structure, from design to construction and lifetime maintenance. Based on the international experience, the geotechnical structural designs of the pervious layers have been modified and adapted to Finnish requirements.

The project also developed storm water modelling methods that take into account the individual qualities and functionalities of the new materials.

Based on the research results and available know-how, the project developed guidelines tailored to Finnish conditions and practices, covering material selection, design, dimensioning, construction and maintenance.

Funded by Tekes, VTT Technical Research Centre of Finland Ltd and 15 industrial partners representing a wide value chain, the CLASS project was coordinated by VTT. Besides, significant labour contributions from the partners were included, and cooperation was undertaken with a parallel Swedish project. The solutions developed will be piloted in several Finnish cities over the spring.

Permeable pavements are already commonly used, in particular in Japan and the United States. In Europe, they are already in use in countries such as Belgium and Germany.

Cities are growing and becoming denser. As a result, an increasing portion of their surface is covered by impermeable materials, such as dense asphalt and different pavement or stone solutions. This has various negative impacts on both the environment and the people. The capacity of stormwater networks may be exceeded; the volume of runoff waters may increase and the level of groundwater decreases.

Climate change further increases the need for

permeable pavements due to higher volumes of rainfall overall, as well as more intense rainfall in the autumn and in the spring.

More information: More information about the CLASS project: www.vtt.fi/sites/class/

Provided by VTT Technical Research Centre of Finland

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