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Integrated Sand Resources Utilization in Agriculture and “Sponge City” Construction**Yuming Su***State Key Laboratory of Silica Sand Utilization, USA*

Aeolian sands are common materials to obtain from deserts, but they are usually poorly graded, inactive, and low in material strength. Thus, they are not appropriate to be directly utilized in most construction and engineering applications and are not considered a resource. Intensive studies have been conducted over the past couple of decades in the State Key Laboratory of Silica Sand Utilization in China, to modify and process aeolian sands into engineered sands. The approach, in general, is using sand as the core material and applying various coatings to meet the desired engineering needs. After innovative research and developments, a series of sand-related products have been invented and widely used in many industries and sectors, such as 1) foundry, 2) stormwater treatment and management, 3) agriculture, 4) building, and 5) oil and gas production. In this presentation, two sand-related products and their associated applications are introduced. 1) Sand-based Pervious Brick: thanks to the special sand coatings and brick formation, the bricks are pervious, with micro pores and full surface infiltration features. The initiative of Sponge City construction in China is introduced, and this Sand-based Pervious Bricks have been widely used in some stormwater management projects during the Sponge City construction. Case studies in China are introduced. 2) Air-permeable Watertight Sand (hereinafter “Breathable Sand”): Multiple coating and surface modification processes are applied to aeolian sand particles, and thus the air permeability can be retained, while the material is watertight due to its water repellency properties. Breathable Sand has been used as a watertight liner in various agricultural applications. Studies showed that about 30%-80% water saving can be achieved with a thin layer of Breathable Sand applied below the roots of the plants. Case studies showed that the roots were stronger and the average leaf count, grain weight, grain per ear, matured grain count, and grain maturity rates were also higher. International case studies are introduced.

Biography

Dr. Su has more than 20 years of work and research experience in water resources engineering, specializing in stormwater management. He is actively involved in “Sponge City” Initiative in China, by promoting international collaboration and sustainable stormwater management concepts and technologies in China. His recent projects include designs of flood controls, green infrastructure, pervious pavers, and stormwater harvesting and reuse, as well as stormwater policy studies. Besides as vice director of State Key Laboratory of Silica Sand Resources Utilization, he serves as an advisory committee member in a couple of Sponge City organizations and institutes. He was a Senior Project Water Resources Engineer with Golder associates, specializing in stormwater management, design, modeling, and planning in the USA. He conducted hydrologic and hydraulic analysis, land development planning, grading and drainage designs, erosion and sedimentation control designs, stormwater pollution prevention plan preparations, stormwater models, low impact development (LID), and best management practice designs for various sites and various clients. He is a Diplomate of Water Resources Engineer by American Academy of Water Resources Engineers (AAWRE), and a Founding Member.