

A Review on Techniques and Materials Used for Permeable Pavement for Storm Water Management

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Abstract: Stormwater management is an important component of urban infrastructure since uncontrolled runoff contributes to flooding, water pollution, and aquatic ecosystem degradation. Impervious surfaces like asphalt and concrete do not allow natural infiltration, which contributes to increased surface runoff and a lot of pressure on drainage systems. Permeable pavement has proven to be a viable sustainable solution that combines structural support and stormwater control. This article discusses a number of techniques utilized in permeable pavement systems for stormwater management in terms of their design, material structure, hydraulic performance, and environmental impacts. Different forms of permeable pavement, such as porous asphalt, pervious concrete, and permeable interlocking concrete pavers (PICP), are compared on the basis of their capacity to promote infiltration, filter contaminants, and minimize runoff volumes. Sophisticated modifications like bio-retention layers, geotextiles, and subterranean reservoirs are also considered for their potential to enhance system efficiency. These systems are evaluated for their performance through experimental research and actual applications, emphasizing their ability to prevent urban flooding, enhance groundwater recharge, and improve water quality by arresting sediments and pollutants. Further, the article discusses the integration of permeable pavement with intelligent technologies like IoT-based sensors for real-time monitoring of infiltration rates and clogging potential. Issues like maintenance needs, durability issues, and cost implications are also deliberated, and planning to maximize long-term performance is discussed. Through this detailed review, the research highlights the significance of permeable pavement as a green stormwater management method and sheds light on directions for future research to further increase its usability in urban and suburban areas.

Keywords: Pavement, storm water management, PICP, Asphalt , pervious concrete