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Towards more sustainable pavement materials and structures – Research overview

Hassan Baaj and Susan Tighe
University of Waterloo, Canada

The research in the area of pavement materials, engineering and design has significantly evolved in the last two to three decades due to environmental, economic and societal reasons. This research became highly oriented towards finding solutions to address these challenges through the increase of recycling, the reduction of energy consumption and CO₂ emissions, the use of alternative materials and other innovations. The Canadian researchers have significantly contributed to these international research efforts through several research projects. The main purpose of this paper will be to present an overview of some research projects on sustainable pavement materials conducted by the researchers of the Centre of Pavement and Transportation Technology of the University of Waterloo in the last few years. The paper will also briefly discuss the current and the future research of the team in this area. One of the main research directions was that of the optimization of the use of recycled materials in the different construction applications. The paper will focus on research projects involving four different types of recycled materials: Reclaimed asphalt shingles, recycled concrete aggregates, recycled roofing shingles and recycled rubber tires. The research on the development of solutions to optimize the energy consumption during the process of manufacturing of bituminous materials was also of great importance for the CPATT researchers. Solution for warm and half-warm asphalt mixes and cold in-place recycling will then be presented. Each solution will be presented briefly and the main results of each projects will be discussed.

hassan.baaj@uwaterloo.ca

Characterising water stress as an issue of the urban agenda in Africa: The case of selected Zimbabwe cities

Innocent Chirisa
University of Zimbabwe, Zimbabwe

Many cities in Africa, perhaps as elsewhere, are facing serious water shortages due to both natural and human reasons. Naturally, these are vulnerable to climate change-induced effects of drought inflicting dryness hitherto unknown if not inexperienced. Supplying water bodies, particularly dams and lacks end up with diminished water resources to adequately meet the demand of the growing urban populations throughout the year. The human dimension to the water stress is one explained by increasing urbanisation which tends to lead to a compromise in the quality and quantity of water especially for drinking. Because huge-size informal settlements are emerging in so many edges of the African city where the water supply network is weak, many in terms of population end up relying on underground water resources by drilling boreholes or digging deep wells. The present study is an attempt to characterize water stress as a practical issue gaining currency in African cities by using selected Zimbabwean cities of Harare, Bulawayo and Ruwa as examples. It is a case study of Zimbabwean cities informed by a robust interrogation of existing literature and practices elsewhere. The major question is on how to keep the groundwater replenished by not allowing it to escape the basin unnecessarily given the closed nature of localized water basins. Furthermore, the paper also questions the sustainability and equitability of the notion of water rationing as practiced in some cities in the country like Bulawayo and Ruwa. Largely, the paper argues that with sound practices of urban water management based on adequate knowledge of the dynamics and interplay of population, water engineering technology of purification and decentralized control, and economic sanctions it is possible to finding lasting solutions to water augmentation.

chirisa.innocent@gmail.com