

Abstract

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THERMAL PERFORMANCE ASSESSMENT OF SAND FILLED PLASTIC BOTTLES

ABSTRACT Sustainable materials achieve a number of goals they promote ecological protection, low pollution, and conservation of resources. This is achieved through some characteristics three of which are: low waste, local sourcing, and thermal performance. The current construction industry dynamics globally and locally are not embracing use of sustainable materials. This could be seen through heavy dependence on non-sustainably sourced materials and negligence of earth materials. In fact sustainable materials – in the form of earth raw materials – are only sought in poor regions that lack access to high technology and very rarely in modern cities. This has led to a lack of information about the thermal performance assessments of low-tech construction generally, and earth-filled-plastic-bottle-construction specifically. This research discusses empirically the thermal performance of locally sourced sand filled plastic-bottle-walls, in the Mediterranean climate of Alexandria (Egypt). Methods include literature review and a case study test in which a chamber is constructed in Burj Al-Arab. Empirical studies are supported by computer simulation. The Research shows that sand-filled plastic bottles lead to about 60 Egyptian pounds savings and have a thermal delay that averages over 8 hours during the hot season and promotes a cooler indoor environment. Keywords Plastic bottles, Re-use, Thermal performance, Design Builder, Thermal Lag