

The Experimental House: A Case Study to Assess the Long-Term Performance of Waste Tires Used as Replacement for Natural Material in Backfill Applications for Basement Walls in Manitoba

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Abstract : This study follows a number of experiments conducted at Red River College (RRC) to investigate the short term properties of tire derived aggregate (TDA) produced from shredding off-the-road (OTR) wasted tires in a proposed new application. The application targets replacing natural material used under concrete slabs and as backfills for residential homes' basement slabs and walls, respectively, with TDA. The experimental work included determining: compressibility, gradation distribution, unit weight, hydraulic conductivity and lateral pressure. Based on the results of those short term properties; it was decided to move forward to study the long-term performance of this otherwise waste material through on-site demonstration. A full-scale basement replicating a typical Manitoba home was therefore built at RRC where both TDA and Natural Materials (NM) were used side-by-side. A large number of sensing and measuring systems are used to compare between the performances of each material when exposed to the typical ground and weather conditions. Parameters monitored and measured include heat losses, moisture migration, drainage ability, lateral pressure, relative movements of slabs and walls, an integrity of ground water and radon emissions. Up-to-date results have confirmed part of the conclusions reached from the earlier laboratory experiments. However, other results have shown that construction practices; such as placing and compaction, may need some adjustments to achieve more desirable outcomes. This presentation provides a review of both short-term tests as well as up-to-date analysis of the on-site demonstration.

Keywords : tire derived aggregate (TDA), basement construction, TDA material properties, lateral pressure of TDA, hydraulic conductivity of TDA

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