High Density Polyethylene as an Aggregate Additive in Concrete

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With a goal of reducing sand usage and providing a use for waste plastic, the research conducted studied the impact of adding varying percentages of HDPE plastic by mass into concrete blocks. To determine the benefits or detriments of the HDPE additive, tests of density, workability, weather resistance, wear resistance, and blunt force resistance were completed. The research question was: what is the effect of 1.25, 2.5, 5, and 10 percent HDPE pellet additive by mass on density (g/cm3), slump test (cm), water absorption (g), abrasion (g), and observed blunt force resistance? The plastic pellets will be added to the concrete during the stage where it is being mixed such that the plastic can be as evenly distributed throughout each concrete sample as possible. The results of the experiment were that with increased plastic, there was a lower density, less slump in the wet concrete, less water absorption (to simulate thunderstorms), more mass loss due to abrasion, and less damage induced by blunt force. These results conclusively show that 2.5% HDPE concrete would be ideal to maximize use for waste plastic while still maintaining the structural integrity of the concrete.

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