



## Compressive Strength and Bulk Density of Concrete Hollow Blocks (CHB) with Polypropylene (PP) Pellets as Partial Replacement for Sand

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### Abstract

Plastics are non-biodegradable and the increasing generation of plastics creates a problem of disposal. One promising approach to address this problem is to find other uses for plastics after they are used. While studies on the incorporation of waste materials in concrete abound, little attention has been given to the incorporation of plastic wastes in concrete. Also, these few studies have focused on cylindrical concrete specimens – none in online published articles, to the authors' knowledge, has focused on concrete hollow blocks. The present study narrowed that gap by shifting the focus of research from the conventional cylindrical specimen to concrete hollow block. Thus, the main objective of the study was to assess the potential of concrete hollow blocks with PP pellets as partial replacement for sand. Polypropylene (PP), which is a subset of these plastics, were pelletized and incorporated in concrete hollow blocks as partial replacement for sand. Five batches of specimens, each with 0%, 10%, 20%, 30%, 40% PP replacement (by volume) were molded and cured for 28 days. The compressive strength and bulk density of the specimens from these batches were determined and compared. Results showed that, generally, compressive strength and bulk density decrease as percent replacement increases; however, it was observed that the compressive strength of the specimens from batch with 10% PP replacement were higher compared to batches with 0% PP replacement.

*Keywords:* Polypropylene Pellets; Compressive Strength; Bulk Density; Concrete Hollow Block.

### 1. Introduction

While Republic Act 9003, or the Ecological Solid Waste Management Act of 2000, has set the basis for managing solid wastes in the Philippines, it is not yet fully implemented in the country and the problems associated with solid wastes still persist [1].

Because population increases and the economy expands, solid waste generation has increased rapidly in the Philippines. For example, the national population increased from 86 million in 2005 to 100 million in 2015. It is reported by the National Solid Waste Management Commission (NSWMC) that total annual solid waste generation rate of the country is 30,000 tons/day with 26.6% from Metro Manila mostly from commercial and residential establishments [2]. This is projected to increase by 40% in the next decade. In addition, about 500 to 700 grams of solid waste per day on the average is generated by each person living in an urban area and 300 grams in rural areas. Furthermore, plastics account for 17% of the total solid waste generated in the country [3].

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