

Changing the Environment — An Alternative “Green” Concrete Produced without Portland Cement

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ABSTRACT

Concrete is the most widely used construction material in the world, and with the ever-increasing population the use of concrete is expected to increase substantially. The environmental impacts of using concrete as a construction material are significant, ranging from the CO₂ emitted during its production and transportation, to the disturbance of virgin land for the production of aggregates and the extraction of limestone. Therefore, there is a great need for alternative “greener” materials for use in construction. Furthermore, if these “greener” materials are generated from common waste-streams, the environmental benefits are two-fold: reduced impacts from the manufacturing of building materials and reduced need for stockpiling of common waste products. The focus of this project realizes both of these benefits through the use of fly ash as a replacement for 100% of the Portland cement in concrete and the use of recycled pulverized glass as a replacement for traditional aggregate.

This paper highlights significant technical and human factor findings from a privately sponsored research effort conducted at Montana State University focused on the use of 100% fly ash concrete with recycled glass aggregate. This material was tested to investigate its suitability in construction applications and the applicability of existing design procedures. The material proved promising with respect to its fundamental engineering properties, durability, and structural performance.

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