DEVELOPMENT OF DRY-CAST AND WET-CAST CONCRETE PRODUCTS UTILIZING FLY ASH, BOTTOM ASH, AND USED FOUNDRY SAND
By Tarun R. Naik, Rudolph N. Kraus, Bruce W. Ramme
Reference: CBU-1998-01

ABSTRACT

This paper deals with the manufacture and testing of wet-cast and dry-cast concrete products containing fly ash, bottom ash, and used foundry sand. Test specimens for all dry-cast and wet-cast concrete mixtures have been evaluated for compressive strength, absorption, density, moisture content, and resistance to freezing and thawing as a function of age. A total of 18 dry-cast concrete products mixtures, consisting of six dry-cast brick, six dry-cast block, and six dry-cast paving stone, were manufactured. The dry-cast bricks, blocks, and paving stones were produced using standard manufacturing equipment utilized in the production of dry-cast concrete products. A total of six wet-cast concrete products mixtures, consisting of three wet-cast brick and three wet-cast paving stone mixtures, were also manufactured. Mixtures were manufactured in a conventional manner in a mixer with one cubic yard capacity used for daily concrete production.

One reference mixture without fly ash, bottom ash, or used foundry sand was produced for each dry-cast product. Two mixtures of dry-cast bricks, blocks, and paving stones were produced by incorporating two ash by-product materials into each mix: fly ash as a partial replacement of cement and bottom ash as a replacement of normal concrete sand. The two remaining mixtures of each dry-cast product incorporated fly ash as a replacement of cement and used foundry sand as a replacement of normal concrete sand. Dry-Cast concrete mixtures contained up to 41% fly ash, 33% bottom ash and 36% foundry ash. Wet-cast concrete mixtures contained up to 40% fly ash, 32% bottom ash, and 36% used foundry sand.

One reference wet-cast mixture was proportioned without fly ash, bottom ash, or used foundry sand for both the wet-cast brick and paving stone mixtures. Two wet-cast concrete brick and two wet-cast concrete paving stone mixtures were also proportioned to utilize all three by-product materials: foundry sand and bottom ash as a partial replacement of normal concrete sand and fly ash as a partial replacement for cement.