USE OF HIGH-VOLUME CLASS F FLY ASH FOR STRUCTURAL GRADE CONCRETE
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ABSTRACT

This research was carried out to investigate performance of structural grade concrete incorporating high volumes of low-calcium fly ash. Two different ASTM Class F fly ashes were used. A Portland cement concrete, designed to have 28-day compressive strength of 6000 psi (41 MPa), was used in this investigation as a control concrete. Concrete mixes were also designed to have fly ash substitution based on total cement weight in the range of 0 - 60% by weight. Water to cementitious ratio was maintained approximately constant and the desired workability was achieved by using a superplasticizer.

Concrete was tested for compressive strength, splitting tensile strength, and modulus of elasticity in accordance with ASTM test methods. Compressive strength and splitting tensile strength of concrete were determined at ages 1, 7, and 28 days whereas modulus of elasticity was determined at 7 and 28 days.

High replacement of cement by fly ash in concrete caused reduction in compressive strength, splitting tensile strength, and modulus of elasticity within the experimental range. Compressive strength of fly ash concrete was slightly lower than the reference concrete up to fly ash addition of 60 percent. However, fly ash concretes achieved adequate strengths appropriate for structural application even at the 60% cement replacements.