

ABSTRACT

Portland cement concrete is an outstanding structural material but stresses and cracks often occur in large structures due to drying shrinkage. The objective of this research was to determine the change in length due to loss of moisture from placement through complete drying of portland cement concrete.

The drying shrinkage was determined for four different combinations of Iowa DOT structural concrete mix proportions and materials. The two mix proportions used were an Iowa DOT D57 (bridge deck mix proportions) and a water reduced modified C4 mix. Three 4"x4"x18" beams were made for each mix. After moist curing for three days, all beams were maintained in laboratory dry air and the length and weight were measured at  $73^{\circ}\text{F} \pm 3^{\circ}\text{F}$ . The temperature was cycled on alternate days from  $73^{\circ}\text{F}$  to  $90^{\circ}\text{F}$  through four months. From four months through six months, the temperature was cycled one day at  $73^{\circ}\text{F}$  and six days at  $130^{\circ}\text{F}$ . It took approximately six months for the concrete to reach a dry condition with these temperatures.

The total drying shrinkage for the four mixes varied from .0106 in. to .0133 in. with an average of .0120 in. The rate of shrinkage was approximately .014% shrinkage per 1% moisture loss for all four mixes. The rate and total shrinkage for all four mixes was very similar and did not seem to depend on the type of coarse aggregate or the use of a retarder.