

FIFTEEN-YEAR PERFORMANCE OF HIGH-VOLUME FLY ASH CONCRETE ROADS

By Tarun R. Naik, Rudolph N. Kraus, Bruce W. Ramme

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ABSTRACT

This project was conducted to evaluate the long-term performance of pavements constructed with high-volume fly ash concrete. The pavement was designed in accordance with the State of Wisconsin Standard Specification for Road and Bridge Construction with the exception of the experimental high-volume fly ash concrete mixtures used for this project. A total of six different mixtures were tested, three mixtures with Class C fly ash up to 70% replacement of cement and three mixtures with Class F fly ash, up to 60% replacement. Cores were taken from each of the six mixtures and evaluated for compressive strength, resistance to chloride ion penetration, density, and signs of visual deterioration. Chloride ion penetration was determined to be either very low or negligible for all concrete mixtures. Mixtures containing Class F fly ash had somewhat better resistance to chloride ion penetration than comparable mixtures containing Class C fly ash. Compressive strength of cores taken from the pavement achieved strengths of 45 to 57 MPa. The highest compressive strengths were attained by the two mixtures containing the highest percentage of Class F fly ash. Hardened concrete density for all concrete mixtures were approximately the same. The pavement sections containing the highest percentage of Class F fly ash performed well in the field with only minor surface scaling. All other pavement sections had minimal surface scaling. The major surface defect was pop-outs due to "excessive" chart particles in some of the mixtures. The results of this study indicates that concrete mixtures containing high-volumes of Class C and Class F fly ash are suitable for pavement construction. The oldest concrete section (15 years old) had 70 % Class C fly ash. This section as well as all others are currently in use and performing very well.