

**MECHANICAL PROPERTIES AND FREEZING AND THAWING
RESISTANCE OF CONCRETE INCORPORATING
WOOD FLY ASH**

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ABSTRACT

This paper presents the results of a long-term project at the UWM Center for By-Products Utilization to investigate the effects of wood fly ash on the strength, drying shrinkage, and freezing and thawing resistance of concrete. Four series of concrete mixtures were proportioned to achieve a 28 days compressive strength of 35 MPa. All concrete mixtures contained between nine and 33 percent of fly ash. First was, Control Mixture containing Class C fly ash, and the remaining three contained blends of Class C and wood fly ash. Tests were performed for density, compressive strength, splitting-tensile strength, flexural strength, shrinkage, and freezing and thawing resistance. Strength properties tests were performed up to 365 days, drying shrinkage up to 232 days, and freezing and thawing (relative dynamic modulus, pulse velocity, and length change) tests up to 360 cycles. Based on the results, it was concluded that durable structural-grade concrete could be manufactured using 50% blend of wood and Class C fly ash as a replacement of cement.