

# **DURABILITY OF TERNARY BLENDED CEMENTS IN BRIDGE APPLICATIONS**

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## **ABSTRACT**

The long-term performance of bridge components can be greatly influenced by the durability parameters including freeze-thaw and chloride permeability resistance. Both freeze-thaw resistance and chloride permeability resistance were tested along with the compressive strength of 24 high performance concrete (HPC) mixtures. The effects of binary and ternary blended HPC including silica fume and fly ash were tested with respect to freeze thaw resistance and chloride permeability. The study included observations of how water to binder ratio and curing time affected the pore structure development of fly ash and silica fume concretes when tested using the Rapid Chloride Permeability Test.

The chloride permeability test results prove that both fly ash and silica fume are useful in reduction of chloride permeability. It is evident that fly ash is generally much slower reacting than silica fume from the tests conducted at 7, 28, and 56 days of moist curing. Results also indicate an increase in chloride penetration with increased w/b ratio dependent upon cement composition. A reduction in chloride permeability values can also be seen with increased curing time with the largest reduction between 7 and 28 days when tests were conducted at 7, 28, and 56 days. The results indicate that properly air entrained HPC is generally resistant to the effects of freezing and thawing as there was minimal degradation of the dynamic modulus of elasticity in all specimens tested.