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BUILDING A SUSTAINABLE INFRASTRUCTURE FOR CONNECTING THE CONTINENTS: CROSSING THE BOSPHORUS

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Abstract

Istanbul and the surrounding region has been a focus for major infrastructure projects during the last decade. In order to provide a designed service life of at least 100 years, the specifications for concrete in these transportation infrastructure projects, such as suspension and cable-stayed bridges, TBM tunnels and immersed tube tunnels, include requirements for the properties of constituents and mixture designs, as well as fresh, hardening and hardened concrete properties. A series of testing activities are employed as the basis for the acceptance of concrete materials and mixtures. The compositions of these high performance concrete mixtures are optimized by pre-testing to resist the relevant exposure conditions that impact concrete's durability, including early age cracking, alkali-silica reactivity, and chloride ingress (*Use a more generic term as chloride ingress could be by diffusion, pressure driven or capillary suction*). A full scale trial casting is performed to check the predictions of early age cracking risk studies and to check the effectiveness of any post-cooling procedure. Both the concrete mixtures and production methods are tested during the full scale trials. Properties of fresh concrete at the batching plant, construction site and after pumping are tested. Quality of formwork finish, efficiency of pumping and vibration, workmanship and curing are evaluated. Production phase testing is also required on cores to assure the quality of in-situ properties such as freeze-thaw resistance, paste homogeneity, internal stability and chloride permeability (*Do you mean 'permeability'? What test are you undertaking? Chloride migration test, which is not a permeability test*). A strong network is needed among the designer, contractor, testing agency, concrete producer and constituent suppliers is needed to quickly respond and evaluate any concrete related problems during production.

Keywords: Service Life, Durability, Permeability, In-situ Testing, High Performance Concrete.