CMDWC 2021

Review

Corrosion of Post-Tension Tendons associated with Segregated Grout

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Abstract: Post-tensioned (PT) construction incorporating bonded tendons with cementitious grouts has been used for highway bridges. The tendon duct and the encapsulating grout materials provide barrier corrosion protection for the embedded high-strength steel strand. Although generally used in good engineering practice, cases of PT tendon corrosion have been documented relating to inadequate detailing for joints, development of grout bleed water, and more recently in the past several years- segregation of thixotropic grouts. In the latter case, cases of thixotropic grouts (that have been developed to mitigate grout bleeding) developed physically and chemically deficient grout that have been characterized to have high moisture content and elevated sulfate ion concentrations. The early presence of elevated sulfate ion concentrations in the deficient grout was attributed to hinder stable steel passivation. Case studies of PT corrosion associated with grouts with elevated sulfate concentrations are presented followed by a review of electrochemical techniques and measurements used to identify the role of sulfates in steel corrosion in alkaline solutions such as polarization techniques, electrochemical impedance spectroscopy, and electrochemical noise.

Keywords: post-tension; bridge; corrosion; grout, sulfate, EIS, electrochemical noise