

Experimental Study of Full-Scale Corroded Steel Bridge Piles Repaired Underwater with Grout-Filled Fiber-Reinforced Polymer Jackets

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Abstract: Steel bridge piles, many of which have been in service for over half a century across the United States, are now deteriorating because of corrosion. They often require retrofitting to restore their capacities to their initial design capacities. Grout-filled fiber-reinforced polymer (FRP) jackets are one promising repair alternative among others. This paper presents the findings of a full-scale experimental investigation to study the behavior of steel piles with localized simulated corrosion damage that were repaired underwater using grout-filled FRP jackets. Fourteen full-scale deteriorated piles were repaired with grout-filled FRP jackets and were tested under axial compression. The repair system was able to restore the axial capacity of the piles to the initially designed capacity. A rational approach is proposed and was implemented for the design of the tested repairs in this study. The results indicate that groutfilled FRP jackets can be effectively used to repair steel H-piles with localized corrosion and that the proposed design approach can be used to design the jackets for piles with different degrees of corrosion.

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This paper describes two methods for repair of piles; both of these techniques are protected by two U.S. Patents #8,650,031 and #9,376,782 by Prof. Mo Ehsani.