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Axial Behavior of Corroded H-Piles

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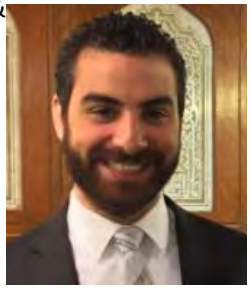

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1 Abstract

H-steel piles are commonly used in river-crossing bridges in the United States. Many of these piles suffered from different degrees of corrosion due to repeated cycles of wetting and drying. Corrosion of H-steel piles affects the buckling behavior of piles which affect the axial load carrying capacity of these piles leading to a significant effect on the whole performance of a bridge. This paper presents the findings of an experimental study that was conducted to evaluate the axial behavior of four full-scale H-piles including a reference pile and three corroded piles with different degrees of simulated corrosion. The results indicate that the reduction of the section change the modes of failure from global to local buckling according to the percentage and place of the corrosion. A non-linear finite element model has been validated with the experimental results. Different design approaches were also used to determine the axial capacity of the corroded piles.

Keywords: Monotonic loading, steel H-piles, Buckling Behavior, and non-linear analysis

2 Introduction

Steel H-piles is a common structural system In the United States. Many of those piles have various levels of corrosion caused by environmental conditions. Assessment of the mode of failure and residual axial capacity should be carried out to assign the appropriate retrofitting measures.

Experimental testing of corroded H-piles is limited [1, 2]. However, investigations on other corroded steel compression members have been carried out [3-9]. Karagah [1] tested 13 H-piles with different scenarios of corrosion and compared the results with those obtained using the design approach in the 14th edition of the AISC [10]. The results were also compared to those obtained following the two different design approaches available in the AISI

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