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Effect of Corrosion of RC Pier on Seismic Performance of Bridges

Nagaraju A S V[1], Ratnesh Kumar[1]

[1]Department of Applied Mechanics, VNIT Nagpur

Abstract

Effects of corrosion on reinforced concrete bridges have drawn more attention in recent years. Corrosion of RC structural members causes deterioration of strength and ductility, which subsequently affects the service life of the RC bridges. It has been observed by many researchers that the most crucial parameter for deterioration of RC member capacity is corrosion of reinforcing steel bars. The amount of corrosion in reinforcing steel bar of RC elements depend on type of exposure, duration of exposure, concrete quality and durability parameters. In present study, the state of corrosion has been classified as non-corrosion, slight, moderate and severe corrosion of reinforcing steel bar. Assessment of the strength degradation of bridge piers at various stages of service life has been carried out considering the effect of area loss of steel cross-section due to pitting corrosion and reduction in steel yield strength. Change in seismic performance of the bridge pier at given stage of the service life has been assessed using nonlinear static analysis. From the results, it has been observed that the pitting corrosion reduces the bending moment capacity and corresponding curvatures of RC piers. Ultimately, the different levels of pitting corrosion can be related to the reduction of base shear capacity which significantly affects the bridge service life for the anticipated seismic forces.

Keywords: RC pier, Bridges, Corrosion, Seismic performance, Nonlinear analysis