17th Symposium on Earthquake Engineering
November 14-17, 2022
IIT Roorkee, India
Paper No. 181

Lateral Capacity of Concrete Bridge Piers with Steel Rebar Reinforcement and Glass Fibre Reinforced Polymer Rebar Reinforcement

Prateek Maheshwari[1], Hema Malini Periyasamy[2], Kamatchi Palaniyandi[3], Sreekala R[4]

[1]B.Tech. Summer Intern, Indian Institute of Technology, Ropar
[2]Project Associate, CSIR-Structural Engineering Research Centre
[3]Senior Principal Scientist, CSIR-Structural Engineering Research Centre

Abstract

Corrosion remains a challenge for maintenance of important infrastructure like bridges and researchers are involved in looking for alternative materials for replacement of steel reinforcement. Studies are reported in literature on fabrication and characterisation of engineering properties of Glass Fibre Reinforced Polymer (GFRP) rebars. Non-degradable property of GFRP rebars against alkaline and corrosive environment is the major desirable characteristics for infrastructure located at severe corrosive sites like offshore. Studies are reported in literature on the use of GFRP rebars for bridge decks. In the present study, three-span continuous steel girder composite bridge consisting of two bents with two piers each with a concrete deck slab has been considered. Two types of reinforcements are considered for bridge piers viz., steel rebar reinforcement and GFRP rebar reinforcement. Stress strain and other engineering properties of GFRP rebars are adopted from literature. Lateral capacity of bridge bents is evaluated through pushover analyses. Base shear capacity of bridge piers with GFRP reinforcement is observed to be similar to the base shear capacity of bridge pier with steel reinforcement however, ductility is observed to be very less for bridge pier with GFRP reinforcement . Hence it will be desirable to use GFRP rebars and steel rebars in combination in order to achieve desirable inelastic behaviour of bridge piers for highly corrosive sites located at high seismic prone zones.

Keywords: Bridge piers, GFRP reinforcement, Lateral capacity