An Analytical Study of RC exterior flat beam – Column Connection Under Lateral Loads*

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Abstract

RC moment-resisting frames (RCMRFs) have commonly been used for low-to-moderate rise buildings in seismic prone regions. RCMRFs can perform well when they are subjected to strong earthquake ground motions if they are properly designed and detailed to dissipate the seismic input energy through deformations in inelastic range. The connections between beams and columns thus become critical components to the performance of these structures.

In conventional RCMRF connections, the width of the beam does not exceed the width of the column. Adopting a flat beam system for the design scheme provides many advantages, such as the reducing the amount of formwork required, the simplicity for repetition, and the decrease of the required story height.

RCMRFs with flat beams have been used extensively, despite the lack of sufficient information on how this system behaves under earthquake loading which leads the codes to restrict the use of flat beam-column connections in earthquake prone regions.

In this research, an analytical study was conducted to investigate the seismic behavior of existing exterior RC flat beam-column connections that were tested experimentally within a paper of Zahran (2008). The experimental and analytical results were compared. The behavior of the specimens under the influence of critical influencing factors like column axial load, transverse beam, and beam bar anchorage ratio were also analyzed through the parametric studies carried out. Several conclusions were mentioned based on this current research.

Keywords: Flat Beam, Transverse beam, Cyclic load.

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