SHAKING TABLE TESTS ON HAUNCH RETROFITTED REINFORCED CONCRETE FRAMES

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Issue: Special Issue on First South Asia Conference on Earthquake Engineering (SACEE’19)

Vol: 3

Pages: 233-240

Date: January 2020

Abstract:
Shaking table tests were performed on five one-third reduced scale two storey reinforced concrete (RC) moment resisting frames having construction defects (using low strength concrete without confining ties in beam-column joints, larger tie spacing, and reduced longitudinal and transverse reinforcements). The deficient frames were observed to have severe joint damageability, resulting in joint panel cover spalling and core concrete crushing. Haunch retrofitting technique was adopted to upgrade the seismic behaviour of deficient RC frames. Additional four deficient RC frames were built and retrofitted with steel haunch; both axially stiffer and deformable with energy dissipation, fixed to the beam-column connections to reduce shear demand on joint panels. The as-built and retrofitted frame seismic response modification factor (R) was calculated and compared to evaluate the viability of the haunch retrofitting technique. The haunch retrofitting technique increased the lateral stiffness and strength of the structure, resulting in the increase of structure overstrength. The retrofitting increased R factor by sixty percent to one hundred percent. The presented results indicate that the technique can significantly enhance the seismic performance of deficient RC frames, particularly against the frequent and rare earthquake events.

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