

Seismic Retrofitting of Damaged URM and Confined Masonry Buildings: A Comparative Performance-Based Study

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Abstract. This paper studies the response of two neighboring masonry buildings in Kruja, Albania, both classified as damage state DS-4 prior to retrofit intervention. The two buildings are geometrically similar, yet structurally distinct: one is unreinforced masonry (URM), and the other represents a deficient confined masonry (CM) system with inadequate confinement detailing. All retrofit schemes were then designed according to performance-based principles and tailored to address the particular deficiencies in each case. For the URM structure, the retrofit scheme included tie, in work to introduce reinforced concrete elements to change the global load-resisting system. For the confined masonry building, the retrofit scheme was designed to strengthen and rationalize an existing ineffective confinement system. Nonlinear static analyses were conducted for both pre- and post-retrofit configurations. The results indicate substantial improvements in lateral strength and deformation capacity for both buildings. However, the nature and magnitude of improvement differ between the two systems. The URM building exhibits a more pronounced transformation of its seismic response, while the confined masonry building shows a more gradual, incremental improvement. The study underlines the importance of accurate structural diagnosis in selecting appropriate retrofit measures.

Keywords: Seismic retrofit; Masonry buildings; Performance-based design; URM; Confined masonry; Nonlinear analysis; Spectrum-based assessment.

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