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# Effects of Earthquake Induced Debris to Pedestrian and Community Street Network Resilience

**Authors :** Al-Amin, Huanjun Jiang, Anayat Ali

**Abstract :** Reinforced concrete frames (RC), especially Ordinary RC frames, are prone to structural failures/collapse during seismic events, leading to a large proportion of debris from the structures, which obstructs adjacent areas, including streets. These blocked areas severely impede post-earthquake resilience. This study uses computational simulation (FEM) to investigate the amount of debris generated by the seismic collapse of an ordinary reinforced concrete moment frame building and its effects on the adjacent pedestrian and road network. A three-story ordinary reinforced concrete frame building, primarily designed for gravity load and earthquake resistance, was selected for analysis. Sixteen different ground motions were applied and scaled up until the total collapse of the tested building to evaluate the failure mode under various seismic events. Four types of collapse direction were identified through the analysis, namely aligned (positive and negative) and skewed (positive and negative), with aligned collapse being more predominant than skewed cases. The amount and distribution of debris around the collapsed building were assessed to investigate the interaction between collapsed buildings and adjacent street networks. An interaction was established between a building that collapsed in an aligned direction and the adjacent pedestrian walkway and narrow street located in an unplanned old city. The FEM model was validated against an existing shaking table test. The presented results can be utilized to simulate the interdependency between the debris generated from the collapse of seismic-prone buildings and the resilience of street networks. These findings provide insights for better disaster planning and resilient infrastructure development in earthquake-prone regions.

**Keywords :** building collapse, earthquake-induced debris, ORC moment resisting frame, street network
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