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Quasi-Static Testing of RC Infilled Frames and Confined Stone-Concrete Bearing Walls

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Abstract: This article presents an experimental investigation of the seismic performance of gravity load-designed RC infilled frames and confined bearing walls of limestone masonry backed with plain concrete. Five infilled frames and two bearing walls were constructed at one-third scale and tested using reversed cyclic lateral loading and constant axial loads. Effects of openings, axial loading and infill interface conditions were examined using quasi-static experimentation. The two structural systems exhibited similar lateral resistance and energy dissipation capacities with higher global displacement ductility for the infilled frames. Hysteretic behavior of the infilled frame models exhibited pinching of the hysteretic loops accompanied by extensive degradation of stiffness whereas loops of the bearing walls were free of pinching. Test results confirmed the beneficial effect of axial loading on lateral resistance, energy dissipation and ductility of the bearing walls. Higher axial loading resulted in a substantial decrease in ductility with no significant effect on lateral resistance of the infilled frames. Openings within the infill panel reduced significantly the lateral resistance of infilled frames. Using dowels at the infill panel interfaces with the base block and bounding columns enhanced the maximum load-carrying capacity of infilled frames without impairing their ductility.