

## Seismic Resistant Columns of Buildings against the Differential Settlement of the Foundation

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**Abstract :** The objective of this study is to determine how Canadian seismic design provisions affect the column axial load resistance of moment-resisting frame reinforced concrete buildings subjected to the differential settlement of their foundation. To do so, two four-storey buildings are designed in accordance with the seismic design provisions of the Canadian Concrete Design Standards. One building is located in Toronto, which is situated in a moderate seismic hazard zone in Canada, and the other in Vancouver, which is in Canada's highest seismic hazard zone. A finite element model of each building is developed using SAP 2000. A 100 mm settlement is assigned to the base of the building's center column. The axial load resistance of the column is represented by the demand capacity ratio. The analysis results show that settlement-induced tensile axial forces have a particularly detrimental effect on the conventional settling columns of the Toronto buildings which fail at a much smaller settlement than those in the Vancouver buildings. The results also demonstrate that particular care should be taken in the design of columns in short-span buildings.

**Keywords :** Columns, Demand, Foundation differential settlement, Seismic design, Non-linear analysis

**Conference Title :** ICRACEED 2021 : International Conference on Recent Advances in Civil Engineering, Architecture and Design

**Conference Location :** Tokyo, Japan

**Conference Dates :** January 07-08, 2021