



Seismic response of mid-rise wood-frame buildings on podium

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Abstract: An analytical study to examine the seismic performance of wood-frame podium buildings up to 8 storeys is presented in this report. Simple archetype podium buildings of 5 to 8 storeys in total height were designed in accordance with the two-step analysis procedure given in 2015 NBCC or ASCE 7-10. Nonlinear time-history dynamic analyses were conducted using earthquake ground motions selected and scaled based on the guidelines proposed by Tremblay et al. to match the reference design spectra in NBCC. Using the performance-based seismic design criteria established in the NEESWood project, it was found that:

Podium buildings with a building period ratio of 1.1 (ASCE 7-10) did not meet the performance criteria, thus the period ratio requirement of 1.1 was not appropriate.

A stiffness ratio of not less than 10 times (ASCE 7-10) was more appropriate as a requirement of using two-step analysis procedure for wood-frame podium buildings up to 8 storeys, compared to that of not less than 3 times (NBCC Commentary). With a higher stiffness ratio, the seismic response of the upper wood-frame structure of podium building was closer to that of the pure wood-frame structure.

The results of this study will be used to guide the assessment of the feasibility of constructing wood-frame podium buildings of 8 storeys in height and the development of design guidelines. This would also guide the longer-term goal of proposing changes to the building codes.

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