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Spotlight on *Structures*

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Don't forget that the latest issue of *Structures* (Volume 27, October 2020) is available at www.sciencedirect.com/journal/structures/vol/27.

Editor-in-Chief, Leroy Gardner, has selected a paper on 'Performance of a novel slider device in multi-storey cold-formed steel modular buildings under seismic loading' as his 'Featured Article' from this issue. The article will be available free of charge for six months.

Editor-in-Chief's Featured Article

Performance of a novel slider device in multi-storey cold-formed steel modular buildings under seismic loading

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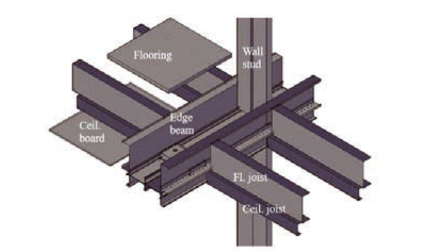
Highlights

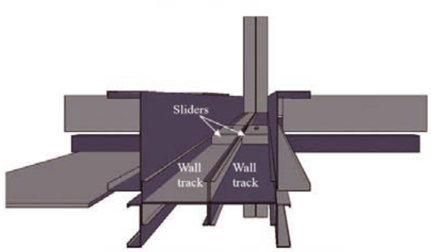
- A validated numerical model was used to analyze a six-storey modular steel building under earthquake loading.
- The six-storey building had a proposed slider device installed at each levels.
- The proposed sliding system in the six-storey modular steel structure was capable of achieving all the desired performance objectives.
- When subjected to the scaled earthquakes, the modules slid in alternate directions at different floor levels within a maximum displacement defined by the 2.5% drift requirement.
- Maximum energy dissipation of more than 80% was observed through friction and rubber hysteresis in the proposed system.

Abstract

A 0.25-scale three-storey stacked modular steel structure, with a novel slider device used at each floor level, was built, and subjected to seismic biaxial base excitation in a series of shake table tests. The test results were reported in the literature by the first author of this paper, which showed that the proposed slider device and the modular steel structure performed well under seismic loading. This paper extends the work of previously reported shake table tests by developing a numerical model. The numerical model has been validated against the test results of the three-storey modular structure. The validated numerical model has then been extended to a six-storey structure consisting of six modules in total (one unit at each floor) with the same material, link, member and constraint properties as used in the three-storey building. The applied gravity loads for each module were also the same as that in the three-storey test structure. The six-storey structure has been subjected to a range of earthquake records from the El Centro, Delta, Kalamata, Chihuahua, Corinthos, Westmorland and Chi-Chi earthquakes that occurred in the past; all these records were scaled according to the loading standard (AS/NZS 1170) for a design site located in Wellington City, New Zealand. These further analysis results on a six-storey modular structure provide a better indication of how a full-scale perfectly built multi-storey modular steel structure with the slider units behaves in practice. As revealed by the analysis results, the proposed sliding system in the six-storey modular steel structure can achieve all the desired performance objectives. When subjected to the scaled earthquake records applied in both the longitudinal and transverse directions, the modules slide in alternate directions at different floor levels within a maximum displacement defined by the 2.5% drift requirement and subsequently self-centered within a tolerance of 5mm at the conclusion of the severe shaking. While sliding, all modules remain stable and were not prone to any collapse and soft-storey failure at lower levels. During the severe shaking, more than 80% of the seismic input energy is dissipated through friction and rubber hysteresis in the proposed system.



(a) Typical CFS modular framing



(b) Slider devices in wall tracks of neighbouring modules

→| Read the full paper at **https://doi.org/10.1016/j.istruc.2020.05.051**

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