

Study on Seismic Performance Evaluation of Modern Wooden School Buildings in Japan

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ABSTRACT

Japanese school buildings have been changed from modern wooden structures to reinforced concrete structures after the Building Standard Law was established in 1950. Therefore, only few modern wooden school buildings exist currently. Ensuring the seismic resilience of these wooden school buildings is essential for their preservation. The structural characteristics of these buildings are different from other Japanese wooden buildings. The main seismic elements are large section braces and knee braces. All braces and knee braces were fixed on the column using a steel bolt. The column was connected to the beam or ground sill using metal connectors on each side of a connection.

A large number of studies in Japan focused on the seismic performance of wooden brace frames. However, only a few studies have focused on the large section brace used for modern wooden school buildings. In addition, a small number of studies have addressed wooden knee brace. Thus, almost no experimental data are available for evaluating the seismic performance of modern wooden school buildings. The objective of this paper is to develop a 3D frame model for the seismic performance evaluation of modern wooden school buildings.

In a previous study [1], full-scale static lateral loading tests were conducted for wooden frame, single brace, cross brace, and knee brace specimens to examine the fracture modes and the relationship between the lateral load and deformation. These four specimens were designed based on the site investigation of existing modern wooden school buildings. In addition, static pushover analysis was carried out for these specimens using a 2D frame model to simulate the relationship between lateral load and deformation. The analysis models were developed and compared with test results to examine their validity. Analysis results were in good agreement with test results.

In the present study, static pushover analysis was carried out for a modern wooden school building using a 3D frame model to simulate the relationship between lateral load and deformation. The 3D frame model was proposed based on the site investigation and 2D frame model. Based on the analysis results, the bearing capacity and deformation capacity of a modern wooden school building were evaluated.

REFERENCES

- [1] Ebisuoka, M., and Miyamoto, M., Study on Seismic Performance of Timber Frame Used for Modern Timber School Building, *AIJ Journal of Structural Engineering*, 64B, 453-461, March, 2018.