RECENT RESEARCH ACTIVITIES

Cyclic loading tests of 3-storey CLT structures

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1. Introduction

For the sake of promoting cross laminated timber (CLT) structure, Japanese government notifications (GN) on the structural design of CLT panel buildings and definition of standard strength of CLT were issued on 2016. Following the issue of the GN, the guidebook on the regulations of the GN and the manual on design and construction of CLT panel buildings were published on Jun. and Oct. 2016 respectively. In the GN and manual, three kinds of platform framing CLT structures were classified. Besides the platform framing structure, balloon framing structure (Figure 1) is the other type in CLT buildings. However, there is little information about the balloon framing CLT structures in current standard. This research studied the seismic performance of balloon framing structures and compared with the standard model specified in GN.

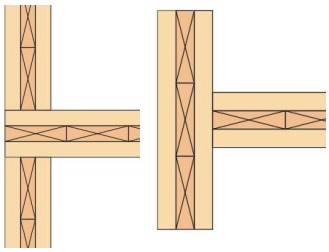

Figure 1. Platform and balloon framing structures

2. Research subjects

Seismic performance of balloon framing CLT structures

Static cyclic loading tests were carried on four full-scale 3-story CLT structures: ① platform framing with small size shear walls; ② balloon framing with continuous shear walls; ③ platform framing with broad panels; ④ balloon framing with continuous shear walls coupled with glulam beams. The photos of 4 specimens were shown in Figure 2.

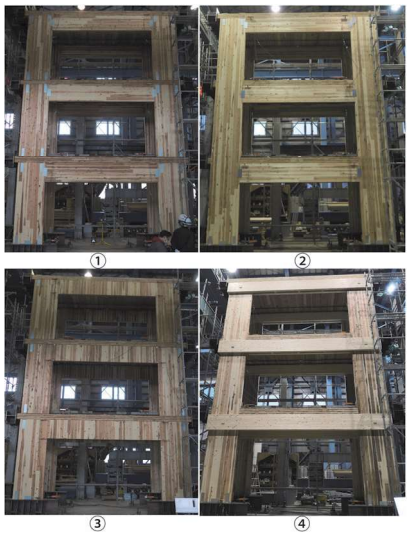

Figure 2. Photos of 4 specimens

Feasibility of design method specified in GN

Since the balloon framing structures have not been specified in current standard, the seismic design should follow limited strength design method, which is much complex than allowable design method. According to the experiment results, the seismic performance of ② and ③ are similar with standard model of GN. It is possible to apply the allowable design method to these two types of structures.

3. Future plan

In order to verify the results, numerical models will be built and analyzed. Corresponding element tests will be conducted to get the structural properties of CLT members and joints, such as the embedment tests, compression tests and beam-wall tests. In addition, the results of static tests will be contrasted with that of corresponding shaking table tests (as shown in Figure 3).

Figure 3. Shaking table test