

Development of design and construction technologies for mixed-structure buildings using new wood materials

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1. Introduction

The use of wood resources is called for in the field of construction, which accounts for a large ratio of demand for lumber. An effective way to increase the use of lumber is to use lumber as the structural material for relatively large construction projects. To increase the use of lumber, there is a demand for the structure design method, fireproof design method, durable design method, and other relevant methods that use common technologies to be applied to midrise mixed-structure wooden buildings with wooden structures constructed with large wood panels, such as CLT and other types of structures. Researchers are thus developing technologies to establish these methods. This report introduces the outline of the technological development.

2. Outline of technological development

Neither construction experience nor technical references are scarce for midrise mixed-structure wooden buildings. Thus, researchers set the main expected variations and are examining them together while checking the main technological development categories as follows, which become necessary to realize wooden buildings while checking their designs whenever necessary.

(1) Examinations concerning structural performance

Technological development is conducted for structural design methods and structural performance evaluation methods for joint sections of prototype mixed-type



Figure 1. Image of a prototype (RC rigid frame + wood)

structures that allow the use of lumber as exposed structures or with simple fireproof coating for fireproof sections in the horizontal and vertical directions, which is one of the variations.

(2) Examinations concerning fireproof performance

Technological development is conducted for fireproof design methods by taking into account the effects that the fireproof performance of the wooden structure section has on the entire building while maintaining a good balance between the structural performance stated in (1) and fireproof performance, as well as a mega-structure with high fireproof performance that would contain a fire within a certain section.



Figure 2. Examination of fire within a mega-structure

(3) Examinations concerning durability

Technological development is conducted for the establishment of design and construction methods, durability evaluation technologies, and maintenance and management methods intended to improve the durability of midrise wooden structures focusing on moisture from the infiltration of rainwater and condensation, which become the cause of decay in wooden structures.

3. Future plans

Technological development is going to be continued in cooperation with the relevant bureaus of the Ministry of Land, Infrastructure, Transport and Tourism, Building Research Institute, intellectuals, and relevant organizations (e.g. industry organizations in the field of wooden structures).