A Study on Standard Floor Section Specifications for Wooden Buildings in Consideration of Sound insulation Performance and Cost-effectiveness

(Research period: FY2022 - FY2023)
YAMAGUCHI Hideki (Ph.D. in Engineering), Head,
HIRAKAWA Susumu (Ph.D. in Engineering), Senior Researcher,
Building Department, Equipment Standards Division

Key words: green, decarbonization, sound insulation, heavy floor impact noise

1. Introduction

The New Basic Plan for Housing and Living (Cabinet decision on March 19, 2021) by the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), prioritises the integration of sustainable practices and materials in urban development. A key focus is on augmenting carbon storage in urban environments and endorsing the use of innovative construction materials specifically Cross-laminated Timber (CLT). The initiative encourages the application of wooden construction techniques in the development of medium and high-rise buildings[1].

Further, the analysis conducted on the 2018 Comprehensive Survey of Housing and Living data identified a direct correlation between building construction material and residents' satisfaction with sound insulation performance. **Fig. 1** indicates a lower satisfaction among occupants of wooden construction buildings in comparison to those residing in concrete structures. It highlighting an urgent need for enhancements in sound insulation within wooden constructions to improve their living quality[2].

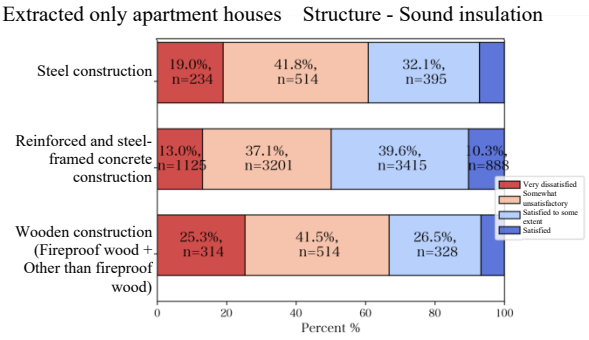

Fig. 1: Cross-tabulation results on building structures and satisfaction with sound insulation performance in the 2018 Comprehensive Survey of Housing and Living

The success in promoting mid and high-rise wooden houses relies on effectively optimizing design and enhancing resident satisfaction. The Public-Private R&D Investment Strategic Expansion PrograM (PRISM) has been dedicated to researching standard cross-sectional specifications that balance sound insulation performance with cost efficiency. The aim is to formulate cross-sectional specification guidelines for inclusion in the public notice of the Japan Housing Performance Indication Standards.

2. Description of the study in the current fiscal year

This year's study involved the construction of a new floor structure as illustrated in **Fig. 2** on the second floor of a six-story full-scale 2 × 4 experimental building at the Building Research Institute. This effort aimed to achieve optimal performance in heavy-weight floor impact sound insulation at a cost lower than or equal to traditional concrete structures utilizing CLT, etc.

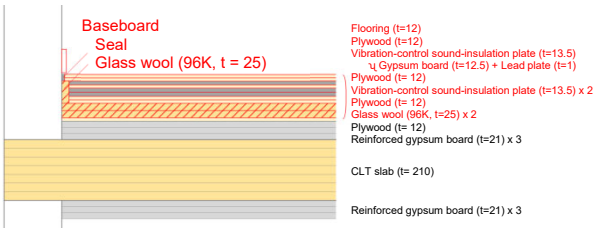

Fig. 2: Example of measured floor section specifications[3]

3. Conclusion

The results of the study will be made public through conference presentations and technical documents as needed.

☞See the following for details.

1) Outline of the New Basic Plan for Housing and Living (Cabinet Decision on March 19, 2021) (Reference: Jan. 24, 2022)
2) Housing Bureau, MLIT: Results of the 2018 Comprehensive Survey on Housing and Living, Aug. 2020
3) Architectural Institute of Japan (ed.), Floor Impact Noise Prevention Design of Buildings (Gihodo Shuppan, Tokyo, 2009)