Method to accumulate and use investigation and diagnostic records using the building information model of outer walls

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1. Introduction

The risk of people being injured by falling objects that peel or deviate from the outer walls, outdoor units of equipment, and signboards is increasing as the number of decades-old buildings increases. Periodic investigations and diagnoses by engineers are obligatory when the building is true to certain conditions with regard to the scale and applications to avoid in order to reduce these risks. However, the information on the outcomes of the investigations is not fully utilized.

This paper describes the investigation, diagnosis, and records of the outer walls of buildings to share the information among relevant personnel and to report the overview of research and development concerning methods of using the information for the offer of guidance and advice to owners and managers of buildings.

2. Challenges in the management and use of investigation and diagnostic records

The purpose of the periodic inspection report system stipulated in Article 12 of the Building Standards Law of Japan is to ensure the safety of buildings by mandating that owners and managers report the outcomes of periodic investigations and inspections of buildings and equipment, such as elevators. In an example of a building that has outer walls with materials that may fall off, such as tiles, the periodic report requires a hammering test for the entire surface of the outer wall when it faces a public road, passage, or space where many people walk within the horizontal surface that is one-half of the height of the wall as a section with a high risk of injuring pedestrians in case of exfoliation. The outcomes of the investigation are reported to designated administrative agencies. Yet, the outcomes are commonly kept in files as paper documents mainly consisting of written information for specific buildings. No attempt has been made to improve the accumulation, management, and everyday safety so that the status of inspections, results of investigations, and diagnoses can be checked for wall surfaces located along a road in a certain area.

3. Ways to use the building information model of outer walls

The research team focused on information utilization technologies using the building information model that is becoming common in the architectural industry in recent years. The team developed a method of accumulating and using the data of periodic inspection reports submitted to designated administrative agencies (with diagrams and pictures of reports describing the outcomes of investigations and diagnoses concerning the risk of exfoliation of the outer walls) by adding geographic information to the building information model of the outer walls.

Specifically, the team examined the method of investigation to measure the appearance and sections of a building from an adjacent road, the method of correcting the coordinate data, and the level of detail to categorize the materials of the outer walls, facilities, and other attached objects. The use of the building information model for the outer walls creates images of the quantity and location of parts with the risk of falling, status of inspection, and risk of exfoliation based on the outcomes of investigations and diagnosis, for example. This enables users to show specific images of the importance of maintenance and management, as well as areas with the risk of falling, to owners and managers of buildings who do not have architectural knowledge. The information is expected to be used in places where proper responses are advised.

Figure. An example of a viewer that visualizes the risk of falling outer walls

4. Conclusion

The team is going to explore methods to use the information to improve the safety of continuous road spaces by expanding the method of using the tool for individual buildings and linking it to GIS and other tools.

☞Detailed information

http://www.nilim.go.jp/lab/ieg/index.htm