

Development of BIM models assuming utilization in existing public rental housing

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1. Introduction

In Japan, as we enter an era of population decline, it is expected that the number of workers, who have supported economic growth so far, will decrease, and it is also necessary to aim for a "productivity revolution" that realizes economic growth by improving productivity in excess of the decrease at construction sites. For this reason, the Ministry of Land, Infrastructure, Transport and Tourism has been promoting "i-Construction" to improve the productivity of the entire construction production system by utilizing Information and Communication Technology (ICT). As part of this, the utilization of Building Information Modeling (BIM) has been promoted. In the field of construction, BIM is also expected to be used in maintenance management and real estate distribution.

The promotion of DX including the introduction of BIM is considered to be one means of promoting streamlining and efficiency improvement of operations throughout (and at each stage of) the life cycle of public rental housing businesses, improving the efficiency of maintenance and management, and so on. Therefore, the Housing Department has been conducting a BIM study survey on public rental housing with the cooperation of the Building Research Institute to study the development of BIM models for maintenance and management based on the

actual conditions of maintenance, management, and operation of public rental housing.

2. Current status of maintenance of public rental housing and the needs for efficiency improvement using BIM

In the BIM study survey on public rental housing, the needs for efficiency improvement in public rental housing has been investigated by interviewing workers in the field and so on.

In the field of public rental housing, and particularly with regard to the maintenance and management of existing housing, it is necessary to appropriately maintain, manage, and operate a large number of public rental housing facilities in the face of financial constraints on local governments, etc., aging of technical staff, and reduction of human resources. It is also necessary to promote preventive management such as appropriate planning and repairs based on inspection results. On the other hand, in the practice of maintenance and management, periodic inspections mandated by law and daily inspections with higher frequency have been carried out, and it was identified that hard copies such as drawings are brought to the site in daily inspections, etc. Processing inspection records and reports takes time and effort because staff return to the office to record and type their data in a finalized format, causing a risk of mis-copying,

and there is a risk of mis-confirmation in checking past inspection results for ordering repair work.

A possible method to address this by improving the efficiency of recording inspection results and maintenance is to change the recording method by introducing tablets that can be carried at the site instead of records using hard copies, and the needs for utilizing the saved data for optimization of maintenance while utilizing BIM, etc., was confirmed.

3. Development of BIM models for maintenance and management of existing public rental housing

Many public rental housing facilities were constructed with a relatively simple design such as a standard design and do not have complex equipment. Therefore, the information handled in the maintenance and management of public rental housing does not need to include details of parts and materials that are used in the implementation design and construction site. A BIM model is considered to be necessarily and sufficiently detailed as long as the information enables the records and updates needed in maintenance and management phases. For this reason, as a BIM model for maintenance and management in public rental housing, a model composed of simple objects that handle space was created.

This BIM model for maintenance and management consists of the following: (1) a profile-and-exterior model, (2) a unit model, (3) a room model, and (4) an equipment model. (The image of each model is shown in Figure 1.) When created for the maintenance and management of public rental housing, the model shall be basically a BIM model based on (1) and (2); it is assumed that a model based on (3) and (4) will be created if a management party needs it.

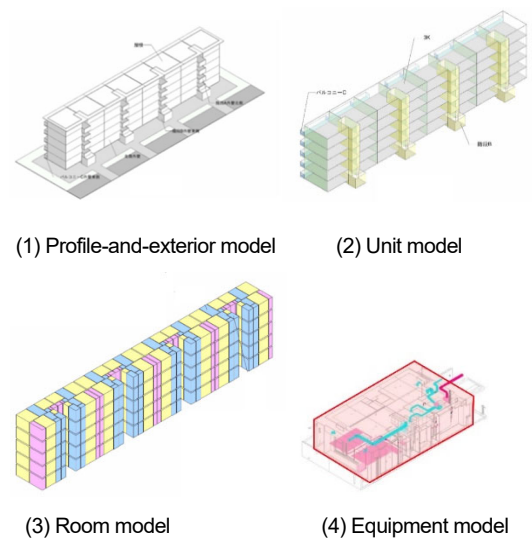


Figure 1: BIM models of public rental housing

Figure 2 shows an image of linkage with inspection work, and Figure 3 is a conceptual configuration diagram of BIMs for maintenance and management. The system does not require the administrator to operate the BIM software. Instead of managing data with a BIM model, a BIM model is regarded as a system and visualization tool for allocating location information and IDs, and it is assumed it will be used as an index to extract information from a database.

Absolute coordinates (latitude and longitude information and height) are regarded as unique IDs (UIDs). This makes it possible to manage maintenance and management information using location information as a key (used for linking information as a unique ID), and linkage with GIS and the like will also become possible.

In addition to organizing the configuration of a BIM model for maintenance and management, demonstration experiments were performed on the utilization of tablets and the BIM model for maintenance and management in daily inspections, etc., and the possibility of streamlining operations (recording inspections and so on, improving the reliability of performance of work, sharing records and data, and so forth)

was examined.

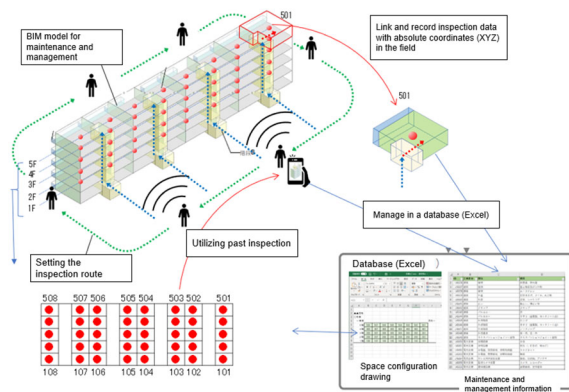


Figure 2: Image of linkage with inspection work

For more information:

- 1) Website of the Housing Stock Management Division
<http://www.nilim.go.jp/lab/ieg/index.htm>

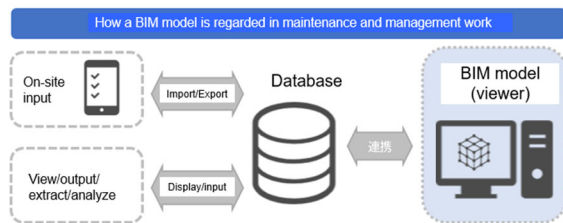


Figure 3: Conceptual configuration diagram of a BIM model for maintenance and management

In addition, using drawings and maintenance and management information on residential buildings of active public rental housing complexes in use that were provided by local governments, case studies of BIM models for maintenance and management were performed using specific information and opinions were exchanged on the usefulness of the BIM models.

4. Future direction

In the future, based on the results of the development of the BIM models, BIM models for the public rental housing business will be created and guidelines for their use will be formulated.

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