UDC 692.6: 69.05

ADAPTATION OF BUILDINGS AND STRUCTURES TAKING INTO ACCOUNT THE ACCESSIBILITY OF LOW MOBILE GROUPS USING BIM TECHNOLOGIES

Oleksandr Suvorkin, Postgrad. Stud., **Mykola Savytskyi,** Dr. Sc. (Tech.), Prof.
State higher education institution
"Prydniprovska state academy of civil engineering and architecture"

Problem statement. Creating an accessible environment for low mobility groups is an urgent problem today. Disabledand elderly people, young children have the same right to use the territory and the house. Therefore, it is extremely important to create all the necessary conditions for them to feel comfortable.

According to the United Nations General Assembly's "Standard Rules for the Equalization of Opportunities for Persons with Disabilities", adopted in 1993, there is a need for equal access to buildings and structures between persons with disabilities and other residents.

Purpose of the Study. The main idea is to use BIM (Building Information Modeling or Building Information Model) technology for the adaptation of buildings and structures. In particular, the creation of a single information model of the house, which would already contain everything necessary amendments and regulations before construction.

Building information modeling (BIM) is becoming the standard in architecture, construction. It provides a method of unified presentation of construction information throughout its life cycle − from the design phase to the maintenance of the building. At the design stage, the main attention is paid to the implementation of requirements and current norms and standards. One of the issues, it is considered to be such is the very important agreements with the accessibility of buildings. Although the design tools usually support the legal requirements for accessibility for people with disabilities. Unfortunately, very little effort has been made in Ukraine to address the quality of access routes and the time, length and convenience of the route.

These information models contain information on the coordination of all building elements, in accordance with the Law of Ukraine "On Regulation of Urban Development" [1], and also meet all the requirements of DBN B.2.2-17: 2006 "Buildings and structures. Availability of buildings and structures for low mobility groups"[2].

Due to the ability to be constantly integrated with other databases, such as elements of engineering systems, structural components, the BIM model allows you to freely change all unbuilt elements before construction. Thus, it saves money on construction and compliance with current Ukrainian legislation and European standards.

Main Results. BIM-based design technology, Autodesk Revit offers an intelligent building model based on a graphical representation. The system is designed to help people determine the routes to be followed by low-mobility groups of people before construction begins, as well as to coordinate other engineering and architectural elements.

In addition to special tools for an easy transition to all buildings, it can be developed interesting architectural solutions that will ensure a comfortable stay in a public house. With the elimination of errors in the general models (at the stages of the project), the problem of incorrect ramps, poor coverage, lack of messages and other available elements to ensure accessibility for people with disabilities is solved.

Also, thanks to BIM, there is creation of specialized equipment for the disabled and control the process of its construction and installation − this is the creation of a common library (BIM Families) of the basic elements. In other words, programs for BIM-design allow to model the basis of a large number of pre-created objects of library elements) [3]. The main idea of such libraries arises because of the manufacturers of architectural elements or designing files in model files through the necessary information on all parameters. Therefore, using ready-made elements, the work of architects/engineers is developed. To do this, the project stage will not apply errors

in the creation of ramps and other special elements, how people can use ready-made elements and adapt them to the situation.

Also, the BIM modeling solves the problem of evacuation for disabled people, BIM-technology allows you to predict the behavior of the object in an emergency. If there is considered the origin of fires at the site as an example, with the help of an information model there are can get information about the nature of possible damage, fire spread, reliability of structures and their work under fire, evacuation routes and time, fire origin scheme [4].

Therefore, it is possible to calculate in advance security cameras for people with limited mobility where they can hide. Or in what places to arrange additional designs and support, and vertical communications and to develop the safest and shortest ways of evacuation.

Conclusions. The advantages of BIM-modeling and the problems of the accessible architectural environment have many points of contact: each advantage of a single information model can be a solution to one of the problems of architecture, so BIM-technologies have a great potential for creating social facilities for people with disabilities.

References

1. Law of Ukraine "On the regulation of urban planning activities" from 16.10.2020. *Information of the Verkhovna Rada of Ukraine*. 2011, no. 34, art. 343. URL: https://taxlink.ua/ua/normative_acts/zakon-ukraini-pro-reguljuvannja-mistobudivnoi-dijalnosti/ (in Ukraine).

2. SBC B.2.2-17: 2006. Buildings and structures. Availability of buildings and structures for low mobility groups. [Effective from 1.05.2007]. Kyiv : Ministry of Construction of Ukraine, 2007, 24 p. (State building norms of Ukraine). (in Ukraine).

3. Talapov V.V. BIM technology : the essence and features of the implementation of information modeling of buildings. Moscow : DMK Press Publ., 2015, 410 p. (in Russian).

4. Chegu Badrinath A., Chang Y. and Hsieh S. A review of tertiary BIM education for advanced engineering communication with visualization. *Visualization in Engineering*. 2016, no. 4 (1). URL: doi:10.1186/s40327-016-0038-6.