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Configuring Updatable Documents Using BIM for Existing Buildings Instead of Previous Documents

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Abstract: Existing buildings and facilities contain relatively static data. The data supports the facility operations, occupancy management and project management on college campuses. The traditional data storage method is 2D system which is paper documents, CAD drawings or PDF files. The storage method system is fragmented and inefficient when it comes to retrieving and updating the parameters of a piece of the facility or equipment. BIM is an effective carrier to host, exchange and upgrade the information. Traditional documentation method sometimes fails to serve in managing the development, rehabilitation and renovation of existing buildings. The lack of appropriate documents, change orders. To address the challenges of life-cycle management of buildings because of current documentation methods does not lend themselves toward managing the continuous changes to buildings. The researcher using one of BIM tools is Autodesk Revit for creating the recent document of case study.

Key words: BIM, update documents, visualization, methods, toward, document

INTRODUCTION

Add BIM to the AEC represents a radical shift in the management of the architectural information from idea to building obsolescence (Eastman *et al*., 2008). Some believe that BIM is a paradigm change instead of 2-dimensional representation of the design, gathering and life cycle management of buildings (Peter and Dietrich, 2008). Raising these points to certify that BIM a new technology and it is suitable for the applicability document generation for existing buildings. The building information in many existing incomplete, abandoned or fragmented buildings is common (Becerik-Gerber *et al*., 2011). Missing or abandoned building information might lead to ineffective project management, unclear process results and cost increases or time loss in retrofit, maintenance or remediation processes. The existing buildings often are not updatable and lack the built documentation. The lack of appropriate documents, change orders and built drawing of existing buildings is very common (Gourlis and Kovacic, 2016). Change management is the biggest challenge in maintaining existing buildings. Time, peoples and natural forces all affect the way function of buildings on the environment. The present method of documenting existing buildings provides large amounts of information but it cannot respond to changes, repairs and renovations (Wagenen, 2012). In the AEC industry, there are different parts of the information based on ideas created by the different experts to implement the project if this information is incorrect and inaccurate will affect the next stages. So, this research will focus on solving the problem of existing buildings that face many challenges to their survival, especially due to the lack of information because of the current documentation method and this study will focus on data collection through different sources such as field measurement, site engineers interviews and image comparison with available project documents these data will be processed in the pattern recognition auto processing of the suitable BIM Software toward 3D geometry of the building documents.

Case study: This project is one of the main buildings in Diyala University Campus. It has a total area of 3000 m^2 while the construction area of 2800 m^2. The information about the building can be summarized as follows:

- The type of contract was a unit price contract
- The building includes (36) rooms and other facilities for different purposes
- The building height reaches to (28.4 m) and consists of five floors
- Ground floor: begins from level (0.9) and ends of level (5.9)
- First floor: begins from level (5.9) and ends of level (10.5)

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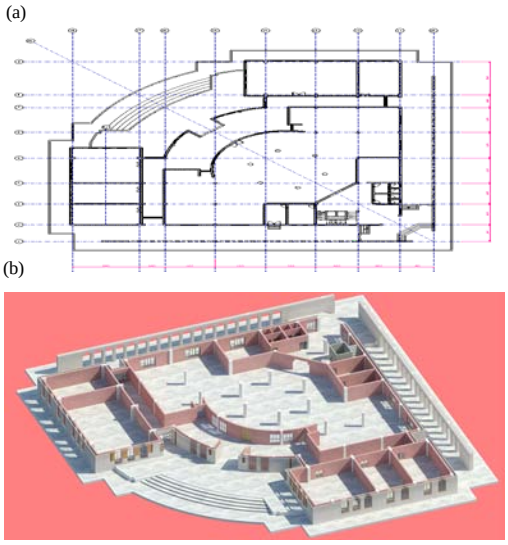

Fig. 1: a, b) Plans (2 and 3D) of the ground floor of case study using BIM

- Second floor: begins from level (10.5) and ends of level (15)
- Third floor: begins from level (15) and ends of level (19.1)
- Fourth floor: begins from level (19.1) and ends of level (23.3)

CONFIGURE UPDATABLE DOCUMENTS OF CASE STUDY

The researcher creating the documents (plans, 2 and 3D) by using BIM for all floors, the documents are created according to the building was built.

The following are documents of case study. Plans (2 and 3D) of ground floor from level (0.9-5.9 m) height of this floor 5 m. The researcher made the document as shown in Fig. 1a and b.

The researcher did not find the documents of the first floor (beams, slabs). The researcher interview with one of the engineers that implemented the building its found that in the beginning the beam was 70 cm as planned but its implemented 90 cm because the columns that were previously implemented were less than the slab, so its implemented 90 cm instead of the 70 cm, the researcher made the plans of beams and slab as shown in Fig. 2a and b. Plans (2 and 3D) of first floor from level (5.9-10.5 m) height of this floor 4.6 m. The researcher made the document as shown in Fig. 3a and b. Plans (2 and 3D) of the second floor from level (10.5-15 m) height of this floor 4.5 m. The researcher made the document as shown in Fig. 4a and b. Plans (2 and 3D) of third floor from level

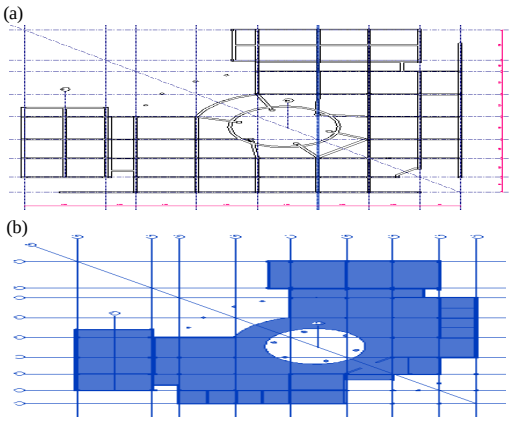

Fig. 2: a, b) The beams and slabs of the first floor of case study 1 using BIM

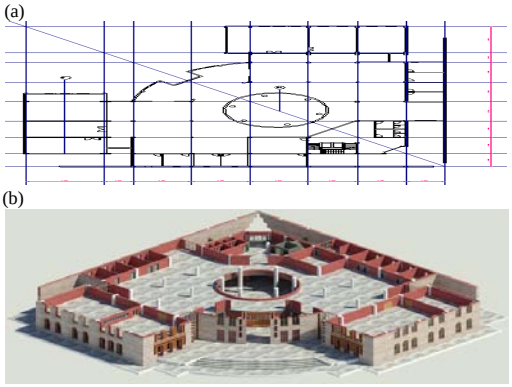

Fig. 3: a, b) Plans (2 and 3D) of the first floor of case study using BIM

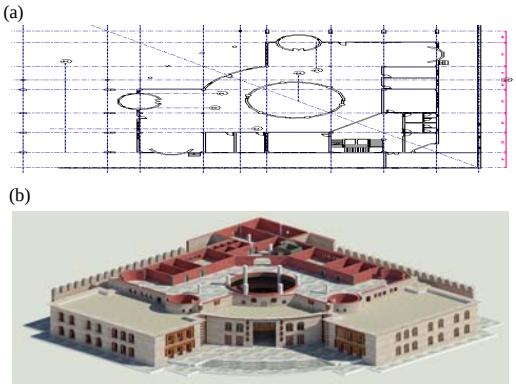

Fig. 4: a, b) Plans (2 and 3D) of the second floor of case study using BIM

(15-19.1 m) height of this floor 4.1 m. The researcher made the document as shown in Fig. 5a and b. Plans (2 and 3D) of the fourth floor from level (19.1-23.3 m) height of this

floor 4.2 m. The researcher made the document as shown in Fig. 6a and b. The elevation of case study as shown in Fig. 7.

Visualization: Visualization is a method for the good of the customer to understand the projects of building and this can be obtained easily when using BIM. Traditional methods are creating 2D drawings that may not be understandable by customers because by 2D drawings the complex projects cannot be envisaged (McArthur, 2015). The researcher used Autodesk Revit 2016 to create a model of case study as shown in Fig. 8.

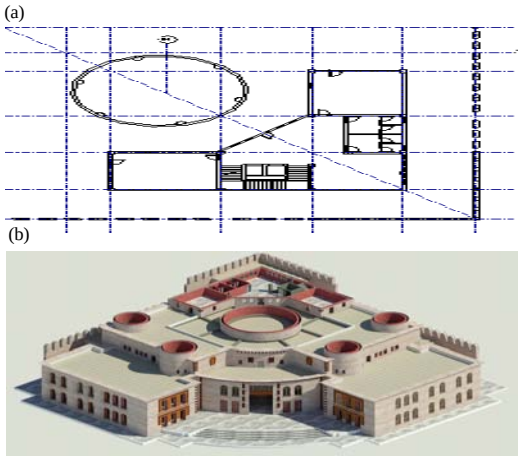

Fig. 5: a, b) Plans (2 and 3D) of the third floor of case study using BIM

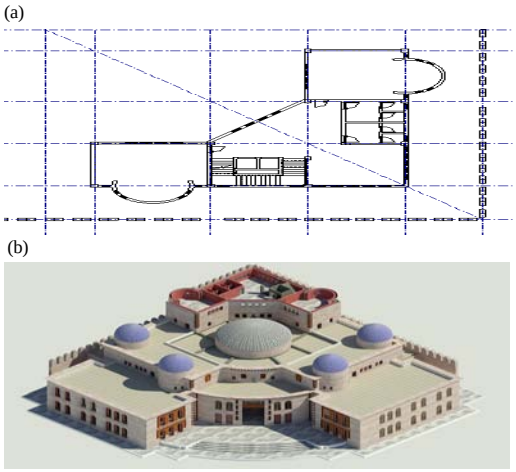

Fig. 6: a, b) Plans (2 and 3D) of the fourth floor of case study using BIM

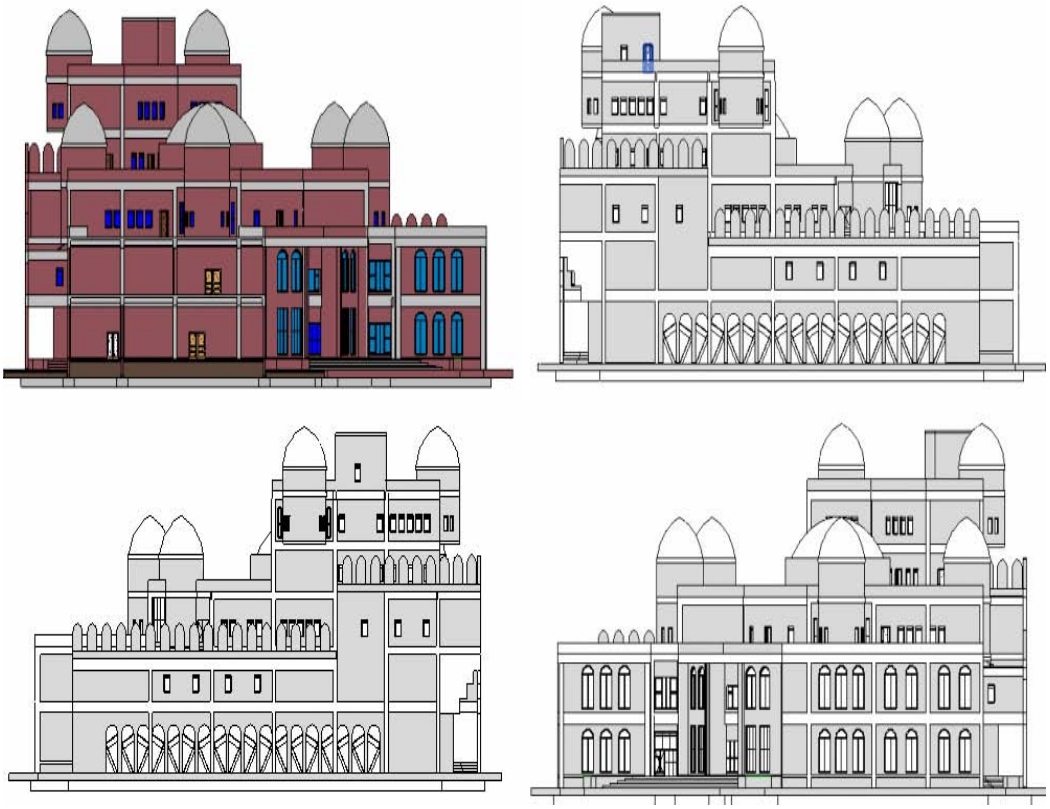

Fig. 7: The elevation of case study

Fig. 8: The model in BIM of the case study

CONCLUSION

Through the use of the proposed approach (BIM) will be able to create updated as-built documents according to the real besides the detection of errors and design mistakes by making a living model which reacts to development changes and keeps an updated record of occasions in a building's life.

The motivation for creating documents is crucially important. It can be useful for maintenance. It was approved that Building Information Modeling (BIM) model was a good alternative of documenting existing buildings through the use of this approach which maintain the possibility of managing the continuous changes through building's lifecycle.

Through the use of the proposed alternative, it was found it is possible to avoid or minimize change orders by a clear vision for the project and provide bill of quantities, 2 and 3D simulation and all the detailed drawings of the project. BIM technique provide better management for databases within the Revit Software to fit with any project type.

REFERENCES

Becerik-Gerber, B., F. Jazizadeh, N. Li and G. Calis, 2011. Application areas and data requirements for BIM-enabled facilities management. J. Constr. Eng. Manage., 138: 431-442.

Eastman, C., P. Teicholz, R. Sacks and K. Liston, 2008. BIM Handbook: A Guide to BIM for Owners, Managers, Designers, Engineers and Contractors. Wiley Publication, New York, USA., ISBN: 978-0-470-18528-5, Pages: 485.

Gourlis, G. and I. Kovacic, 2016. A study on building performance analysis for energy retrofit of existing industrial facilities. Appl. Energy, 184: 1389-1399.

McArthur, J.J., 2015. A Building Information Management (BIM) framework and supporting case study for existing building operations, maintenance and sustainability. Procedia Eng., 118: 1104-1111.

Peter, R. and E. Dietrich, 2008. The meaning of BIM. Proceedings of the 26th Conference on Architecture in Computer, September 17-20, 2008, eCAADe, Antwerpen, Belgium, ISBN: 978-0-9541183-7-2, pp: 531-536.

Wagenen, H.W.V., 2012. Building information modeling and historic buildings: How a living model leads to better stewardship of the past. Master Thesis, University of Pennsylvania, Philadelphia, Pennsylvania.