DESIGN A DETAIL 3D MODEL OF A BUILDING WITH COMPARISON OF MANUAL AND SOFTWARE ESTIMATE ON AUTODESK REVIT

R. S. Bute[1], Md. G. Pathan[2], R. H. Mohankar[3], M. D. Pidurkar[4]

[1,2,3,4] *Assistant Professor, Department of civil Engineering, Priyadarshini J. L. College of Engineering, Nagpur.*

ABSTRACT

Building Information Modeling (BIM) is a new technology in construction industry. It uses real-time models to increase efficiency and productivity in construction projects. With the help of this technology, projects can be completed on time and within budget. Client satisfaction is increased because the clients know what will be the end product during the design stage. Reworks can also be minimized due to better understanding of project and visualization ability.

This paper is on the efficiency of BIM on project drawings and bill of quantity calculations. One of the BIM software, named Autodesk Revit Architecture and traditional way, AutoCAD were used in this thesis to produce project drawings. An apartment building project was selected to prepare project drawings by using both Autodesk Revit Architecture and the efficiency of software in terms of the duration of producing project drawings was compared. Also the possibility of preparing more accurate and fast architectural bill of quantities by Autodesk Revit Architecture and Autodesk Quantity Takeoff were compared with manually obtained bill of quantity calculations.

Key Words: *3D, BIM, Modeling, REVIT, Scheduling, Visualization.*

1. INTRODUCTION

Autodesk Revit Architecture often referred to as simply Revit is a Building Information Modeling software developed by Autodesk. It allows the user to design with both parametric 3D modeling and 2D drafting element. Building Information Modeling is a Computer Aided Design (CAD) paradigm that employs intelligent 3D object to represent real physical building components such as wall and doors.

This project will show how Autodesk Revit technology will benefit for Architect, Engineer and contractors for Estimating & schedule and cost controls. It begins with a general introduction of BIM technology and the different ways it works compared with traditional CAD (Computer Aided Design) method, and continues with evaluation of Autodesk Revit tools. It then explains the uses of Scheduling and Cost Estimating in Autodesk Revit respectively and provides a case study to show how Autodesk Revit can work for Architect, Engineer and contractor.

2 REVIEW OF LITERATURE

Allbban H. Khalid "Utilization of Revit Application as Preliminary Shop Drawing to Improve Construction processes".

This conducted in relation to the benefits of BIM (Building Information Modeling) and Autodesk Revit Software coordination needs to develop a successful and green design. Autodesk Revit Software used to translate the existing 2D drawing into a 3D model along with the information associated with the 3D model.

Xinan Jiang "Developments in cost estimating and scheduling in Autodesk Revit", 2008.

The model or project is a frame structure consists of a one residential building. In Revit first 3D model and then get directly 2D drawing with material quantity and many more which is essential to manage construction of building. In the present work it is created 3D model and able to get 2D drawing as shown below and material quantity as per the requirement. The building consists of the scheduling and estimating of foundation, column, beam, floor and walls is tabulated.

Hyunjoo Kim and John Hildreth "To Developed a Structure for automating the creation of construction schedules", 2013.

The objective of this paper is to develop a structure for automating the creation of construction schedules by using data saved in BIM or Autodesk Revit Software. Using the draw the draw out information, this research proposed system that creates construction tasks, calculate activity durations.

3 METHODOLOGY

Step 1: Creating Architectural design:

Step 2: Creating 3D model:

Step 3: Creating various drawings:

Step 4: Creation of 3D view:

Step 5: Initiating scheduling process:

Step 6: Application:

Details of selected building Plan

Plot Area :- 19.519 × 16.673 m

Built up Area:- 14.549 × 10.472 m

Fig. 1 –Ground floor plan

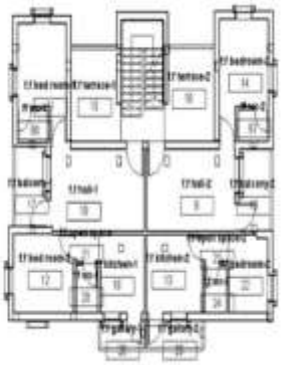

Fig. 2- First floor plan

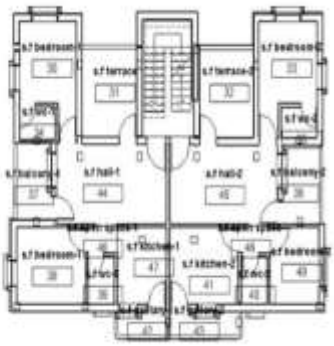

Fig. 3- Second Floor Plan

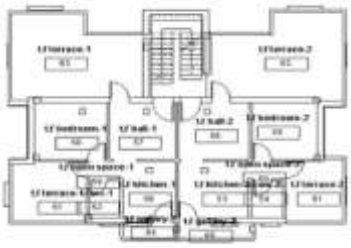

Fig. 4- Third Floor plan

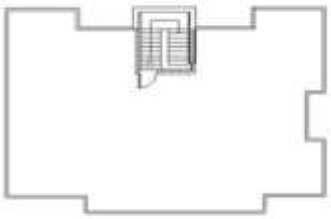

Fig. 5- Terrace Floor plan

Fig. 6- 3D- Elevation

Fig. 7- Rendering View

Fig. 8- 3D – Vie

6 RESULT COMPARISON

Table 6.1-for Comparison of Manual & Autodesk Revit Software Estimate

SR. NO.	DISCRIPTION	AUTODESK REVIT ESTIMATE	MANUAL ESTIMATE	UNIT
1	Excavation	141.75	141.75	CUM
2	Filling in plinth &floor	215.824	215.821	CUM
3	Providing & casting in situ cement concrete for **Columns Footings M-20**	9.015	8.6	CUM
4	Providing & casting in situ cement concrete for **RCC Columns M-20**	19.106	19.495	CUM
5	Providing and casting in situ cement concrete for **RCC Slabs and landings** up to and of 15cm thickness **M-20**	70.598	76.086	CUM
6	Providing & casting in situ cement concrete for metal for **R.C.C. waist slabs, steps and parapet** as per detailed drawings for **Staircases. M-20**	4.213	3.119	CUM
7	**foundation and plinth of inner walls & external walls**, Providing IS type bricks in cement mortar 1:6 in	5.207	4.798	CUM
8	**Superstructure brick work** **External wall**			
a	Ground floor	18.873	25.689	
b	First floor	41.510	41.510	
c	Second floor	40.598	40.598	
d	Third floor	20.645	20.645	
e	staircase wall	21.364	21.369	
	TOTAL QUANTITY	142.996	149.811	CUM

SR. NO.	DISCRIPTION	AUTODESK REVIT ESTIMATE	MANUAL ESTIMATE	UNIT
19	**Superstructure brick work Internal Wall**			
	Ground floor	39.0145	39.014	Sq. m

	First floor		81.9704	81.97	Sq. m
	Second floor		102.0952	102.0.95	Sq. m
	Third floor		93.6822	93.682	Sq. m
	Gallery wall		80.0787	80.0.78	Sq. m
	Parapet wall		38.3829	38.382	Sq. m
	Tower wall		13.6827	13.682	Sq. m
	TOTAL QUANTITY		448.9066	448.903	Sq. m
10	**Internal cement plaster 12mm thick**				
	Ground floor	External wall internal plaster	100.018	104.224	Sq. m
		Internal wall internal plaster	48.33	48.33	Sq. m
	First floor	External wall internal plaster	211.013	212.275	Sq. m
		Internal wall internal plaster	97.417	97.417	Sq. m
	Second floor	External wall internal plaster	206.208	211.173	Sq. m
		Internal wall internal plaster	120.524	122.55	Sq. m
	Third floor	External wall internal plaster	103.778	103.778	Sq. m
		Internal wall internal plaster	133.243	113.243	Sq. m
		Parapet wall	38.503	38.829	Sq. m
		Gallery	88.056	88.056	Sq. m
		Celling	586.882	610.149	Sq. m
	TOTAL QUANTITY		1695.97	1750.0.24	Sq. m
11	**Sand face plaster 15mm cement mortar 1:4**				
	External plaster	Plinth wall	22.641	22.826	Sq. m
		Ground floor	82.113	100.028	Sq. m
		First floor	170.941	199.352	Sq. m
		Second floor	176.122	206.201	Sq. m
		Third floor	89.762	103.778	Sq. m
		Stair case wall	92.908	94.444	Sq. m
	TOTAL QUANTITY		634.487	726.629	Sq. m

7 CONCLUSION

1. In these Revit project set up coarse, we learn that how to save countless frustrating hours, by setting up organized, well thought out Revit project from the start.

2. First, we learn how to develop a BIM execution plan, how to develop approaches for working with consultants, linked files and work-sharing.

3. The most valuable and important result of this thesis is the model of the apartment in the program Autodesk Revit and also it is very easy to get beautiful and very realistic pictures of the apartment for advertising.

4. Finally, I would like to say that it was a great experience for us, we learned a lot of useful things and tools, which help us to grow as a professional engineer and we believe these new skills will be needed for our future job.

8 REFERENCE

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