

Use of Bim For Site Co-Ordination And Its Effectiveness In Construction Management

Vishal S. Patil ¹, A.P.Biswas ²

¹Dept of ME(Construction & Management)

²Assistant Professor, Dept of Civil

^{1,2} Maharashtra Institute of Technology, Pune, India

Abstract- The potential of Building Information Modeling (BIM) to support processes improvement of design and construction has been evident in the construction industry. BIM is helpful in improving design quality by avoiding unnecessary clashes and reducing possibility of rework; although there has less effort in construction sector to use BIM throughout the project for construction and quality control and well-organized data utilization. Due to the reliability of design data with quality data and construction process with quality control process, the prospective of BIM implementation in quality management lies in its ability to present multi-dimensional data including design data and time sequence. The paper sees the sights and deliberates the advantages of 4D BIM for a excellence claim based on construction codes,

I. INTRODUCTION

1.1 General:

Main task of construction manager is to plan the entire project and execute it without any delay and overrun and avoid any wastage and rework. In big complex project there is possibility of error occur during drafting or possibility of overlapping MEP plan with floor plans. In normal construction practice we can't find that before it's too late. If there is overlap between plumbing and floor plan, in normal practice we will notice the clashing during plumbing when floor, slab, beams, walls are already constructed. In such case we will have to change plumbing plan or by redoing work. In both scenario delay will occur and money is send in excess. But by using BIM we avoid such clashes. In BIM all plans are loaded in software, 3d model is drafted on revit and by assigning it cost and schedule we will make that model in 5d. We can stimulate the project so that to get idea about how the work is going to perform and also we do clash detection test to avoid clashes. Also BIM is cloud base software so that we can track project or update it from anywhere. Quickly generate and evaluate multiple design alternatives using data-rich models that more accurately present your design within the as-built environment. Collaborate more effectively with

project teams and stakeholders by sharing cloud-based models of design scenarios, to gather feedback and input in real time.

1.2 BIM implementation for building construction:

Our project has two aspects one is to rehabilitate the city for urban mobility and second is to study the effectiveness of BIM in Building construction. For the infrastructure development we have used the Infracworks 360 software and for the development of building model we have used the Revit software along with the Naviswork software for scheduling and time estimation.

3.2 Level of Development in BIM:

There are 5 Levels of Development:

- LOD 100 - Concept
- LOD 200 – Design Model
- LOD 300 – Construction Model
- LOD 400 – Fabrication Model
- LOD 500 – As-Built Model

Level of Development is nothing but the extent to which BIM model users such as various contractors and fabricators within a project can use and rely on the model for scheduling of elements, pricing, fabrication and construction. LOD only applies to an individual model element.

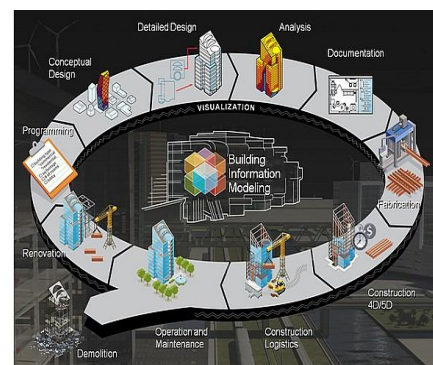


Fig 1: BIM flow chart

3.5 Steps for design of Building model:

Step 1: In the first instance we developed the plan of different floors of the building and ground floor for the parking purpose.

Step 2: After the drawing of plan 3D model of building, the building is made energy efficient by providing solar roof panel, and reducing carbon emission material in the building.

Step 3: After detailed drawing of building the quantities of material and costing is done in Rivet.

Step 4: The building model is extracted in Naviswork software for the scheduling and time and for analysis, simulation, and project information.

Step 5: For energy analysis the geographical data is taken from the web network and various analysis is carried out.

Step 6: Cloud rendering is done through web and the rendered model is shared through.

3.6 Development of model in 4D using Naviswork

Autodesk Naviswork Manage software is a comprehensive review solution for analysis, simulation, and coordination of project information. Multidisciplinary design data can be combined into a single integrated project model for interference management and clash detection. Naviswork Manage helps design and construction professionals anticipate and avoid potential problems before construction.

3.7 Estimation and Costing (5D):

Estimation and costing is done in the Revit software, In this quantities of various items of building works like, wall schedule and quantities, door schedule and quantities, windows quantities, in terms of area Sq.m, Volume in Cu.m etc. is found out for the proposed building. .

1.3 Aim Of Study:

To create 5d model in REVIT+NAVISWORK and perform comparative analysis on BIM and conventional technique

1.5 OBJECTIVES AND SCOPE:

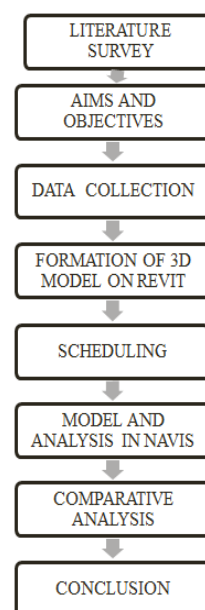
- Study of building information modeling for construction management and its documentation
- Study of 5D tool REVIT +NAVISWORK modeling for effective quality management
- Comparative analysis for Naviswork technique with Conventional

- Questionnaires survey of above output for final conclusion

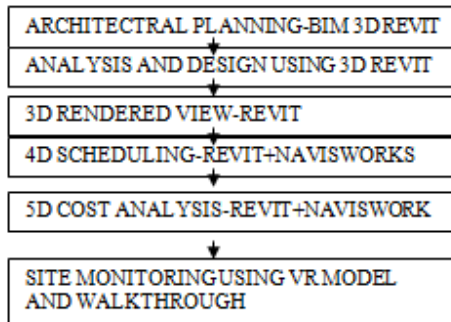
II. LITERATURE REVIEW

It has been appealed that 80 percent of all content within the construction process is almost identical for all projects and there are therefore vast opportunities for enhancements. BIM (Building Information Modeling) can be used by project managers as a good tool to act out project condition to avoid redundant works and waste of time and cost. The conditions planning errors, design errors, amendments due to design errors, misinterpretation of drawings, use of 3D models, discontinuation of information, construction practicality, onsite errors, use of prefabrication, amendments due to construction errors and time extensions identified from the projects were related to its phenomenon of the study to increase quality and productivity while lessening cost and time. After analysis common failures described on the industry, it was found that most of BIM principles involve managerial enhancements, therefore implementing contractual mechanisms to demand BIM in private and public biddings would surely improve industry’s productivity. Ineffective collaboration within project participants during building process is causing poor implementation co-ordination for sustainable development of resort projects. The US National Institute of Standards and Technology (NIST) showed that, in 2004, owners and operations managers bore two thirds of the total industry cost burden from inadequate interoperability in construction projects from inception to operation, amounting to USD10.6 billion.

III. METHODOLOGY



- Flow chart of building information modeling:



IV. CASE STUDY



Fig 2: 3rd eye view of actual site

4.1 Site Details

- Name of site : Cool homes
- Location of site : cool homes, ring road, behind gajanan maharaj mandir, bhusawal, jalgaon.
- A G+4 proposed building of 24 flats and of 4 shops is taken for case study location is in Bhusawal.
- Design Team : Apex consultant
- Owner and Developer :Shivaji Patil
- Architect :Sneha Nichat
- Cost of project : 2.4 cr.
- Structural Engineer: Navneet Patil and Prashant Patil
- Builder :Praj Infra Solutions pvt.ltd.
- Area : 6400 sq.feet
- Residential building having 24 flats and 4 commercial road front shops.
- Total 24 flats and 4 shops.
 - 16 flats – 2bhk
 - 8 flats – 1 bhk
 - 4 shops – commercial road front shops.

4.2 Data Collection

- Centre Line Plan
- Footing & Column plan
- Site Photos
- Construction schedule

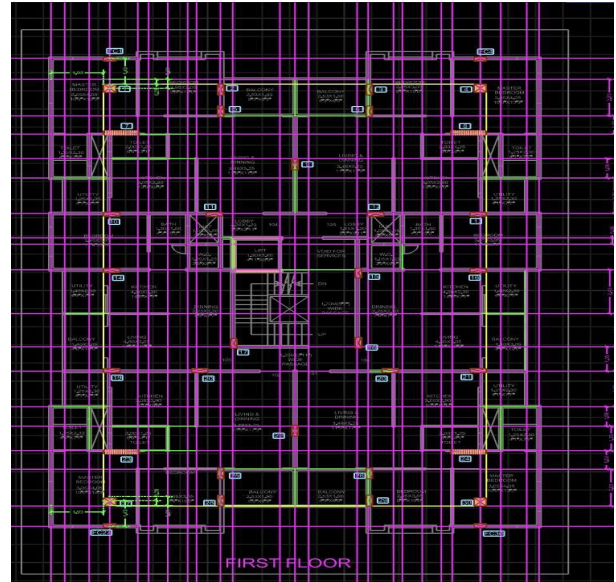
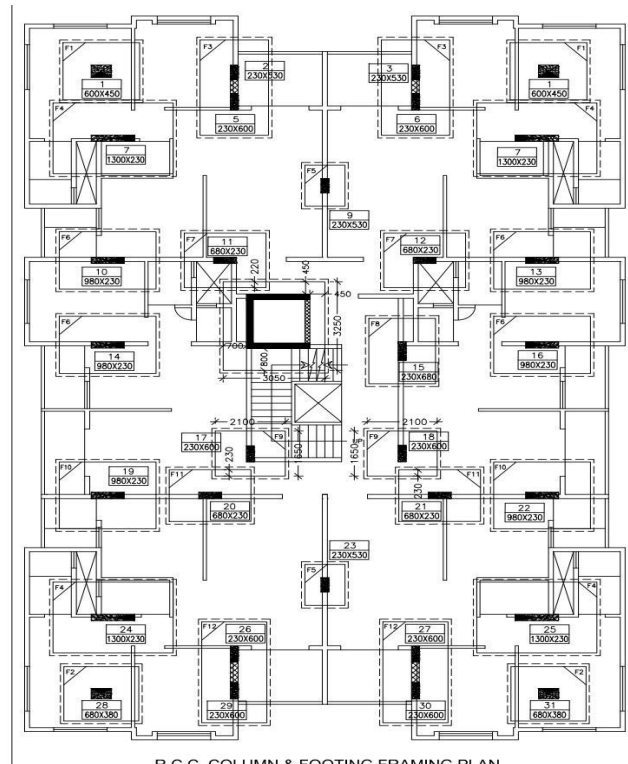


Fig 3. Centre Line Plan



R.C.C. COLUMN & FOOTING FRAMING PLAN

Fig 4. Footing @ Column Plan



Fig 5. Plinth Beam

- Prepare 3d model of cool home in revit and import it in naviswork



Fig 6. 3d Model In Naviswork

- Assign schedule to imported 3d model to convert the existing 3d model in 4d by assigning time factor
- We can also directly import MSP schedule and assign it.

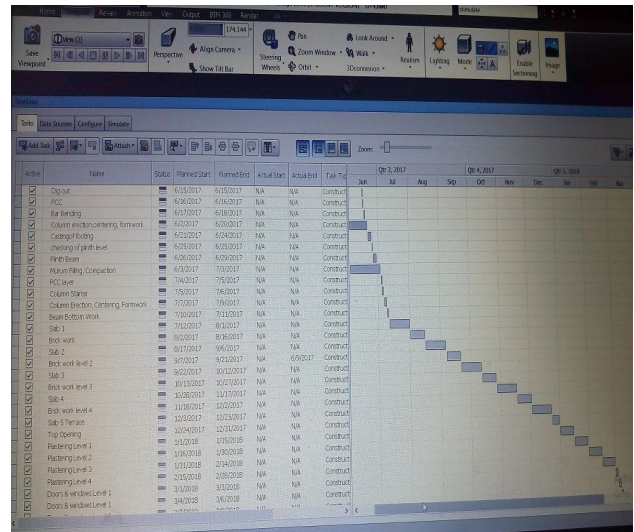


Fig 7. 4d Model In Naviswork

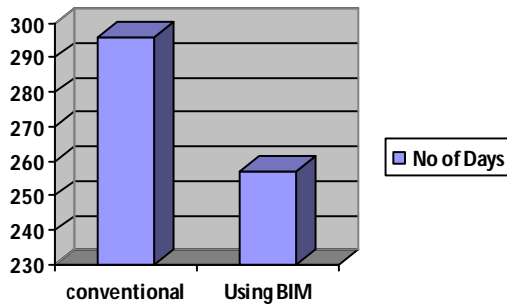
- Once we assign schedule to 3d model we get our 4d model, which we convert in 5d model by assigning it cost factor. Cost factor is assigned to 4d model from estimate and resource sheet. Cost is consist of both material cost and labor cost.
- Once we created our 5d model we can convert it into 6d model by assigning energy factor.
- After we can stimulate the project so as to get idea about how project is going to be developed and also get idea about resource over location if any and cost over run
- Due stimulating project we get actual idea about future activities and we can effectively plan for them.
- Also we run clash detection test to avoid any clashes and their aftermaths.



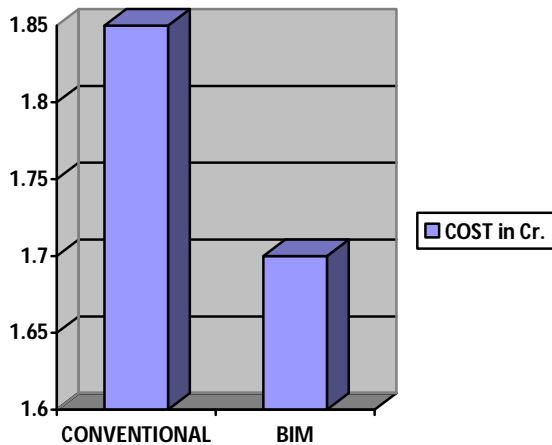
Fig 8. Stimulation in naviswork

RESULT

In Terms Of Duration



In Terms Of Cost



VI. CONCLUSION

This work studies effectiveness of building information modeling for effective project planning, management.

- A 5D model of G+4 building is prepared as per methodology of BIM as mentioned which includes 3d model, scheduling, quantity and costing.
- For present case study it was observed that total 39 days can be saved in total task which will leads to saving in cost as reduction in duration however the cost of material will remain same

REFERENCES

[1] Er. Jashandeep Singh Arora, Er.Navneet Singh, A review paper on modernization of City into smart city, ISSN:2320-8163, May-June, 2016

[2] Michael Batty, Kay Axhausen, Giannotti Fosca, Alexei Pozdnoukhov, Armando Bazzani, Monica Wachowicz, Georgios Ouzounis, Yuval Portugali, “Smart Cities of the Future” Centre for Advanced Spatial Analysis University College London, ISSN 1467-1298, October 5, 2012

[3] Esri India, “White paper –GIS for smart city”, Esri India, September 2014

[4] Imran zaman,” White paper on smart cities”, Daywateacher.com, 31st March 2015

[5] UN Habitat, “habitat issue paper”, United nation conference on housing and sustainable urban development, New York, 31st May 2015

[6] Govt. Of Hong-Kong,” Central policy unit”, The government of Hong-Kong special administrative region, September 2015

[7] Rui pedro lopes fernandes, (2013), ‘Advantages and Disadvantages of BIM Platforms on Construction Site’ [2] Mehmet F. Hergunsel, (2011), ‘Benefits of building information modelling for construction managers And Bim based scheduling

[8] Christoph mershbrock, Bjorn Erik munkvold, (2009) - research review on building information modeling in construction an area ripe for IS research.

[9] McGraw-Hill Construction. (2009). —The business value of BIM: Getting building information modeling to the bottom line. | McGraw-Hill construction Smart Market Rep., McGraw Hill, New York