

4D Modeling of Multi Storied Building using GIS

M R Vishnu

*Department of Civil Engineering
TocH Institute of Science and Technology, Ernakulam, Kerala, India*

Alester Joseph Vanreyk

*Department of civil Engineering
TocH Institute of Science and Technology, Ernakulam, Kerala, India*

Abstract- The conventional method of project scheduling and planning using primavera and AutoCAD does not provide the complete progress of the work in synchronized manner in a single platform. This paper presents new system of planning and scheduling by creating 4D model of building using GIS software. The methodology of 4D model creation by importing AutoCAD drawings and schedule in primavera are discussed in the paper. This method help the engineers, in proper visualization of the project and thereby helps in taking clear cut decision at site and reduce delay in work progress.

Key words: ArcScene GIS, AutoCAD, Primavera P6, Scheduling

I. INTRODUCTION

This paper demonstrates the use of ArcGIS software in the creation of 4D model of a building and highlights its advantage in the construction industry. The creation of 4D model is done by integration of AutoCAD drawings and schedule created in Primavera P6, in ArcScene module of ArcGIS. Main advantage of 4D modeling is that it helps in visualization of the project, with both the 3D model and the schedule, hand in hand in a single platform. This helps in reducing the construction errors occurring in the sites and thereby reduces the delay in site.

Xing Su and Hubo Cai proposed a 4D-CPM based graphical scheduling system consisting of a conflict-free 4D model. V K Bansal presented a survey of different application of GIS to construction industry as well as methodology to generate 3D and bar chart to represent the construction schedule. David.et.al discusses about the need of 4D CAD modeling in the construction industry. The reviewed literature hasn't focused on integration of Primavera P6 scheduling in GIS. This paper deals with the formulation of 4-D model of multi storied building using AutoCAD, Primavera P6 and ArcGIS.

II. BACKGROUND OF THE PROJECT

The objective of this paper is to display the progress and sequence of the construction work in AutoCAD format and in 3D while synchronizing this information with primavera work schedule. This work is expected to help in visualizing the progress of work, hence minimizing delays and cost overruns. To show the feasibility of the work it's done on a residential building.

The site for the proposed building is situated at Ponekkara, Ernakulam. The site is a calm residential zone, away from the uncomfortable and polluted industrial zone. The site is located in such a way that communication, nearness to markets, medical facilities, school, recreational areas etc and utilities like water, electricity etc are available. The site has good drainage and sewage facilities. The area of ground floor is 106.60 M² comprising of sit out, drawing room, dining room, kitchen, work area, and 2 bed rooms with one attached toilet. The area of first floor is 68.25M² comprising of living, 2 bed rooms with attached toilets and open terrace.

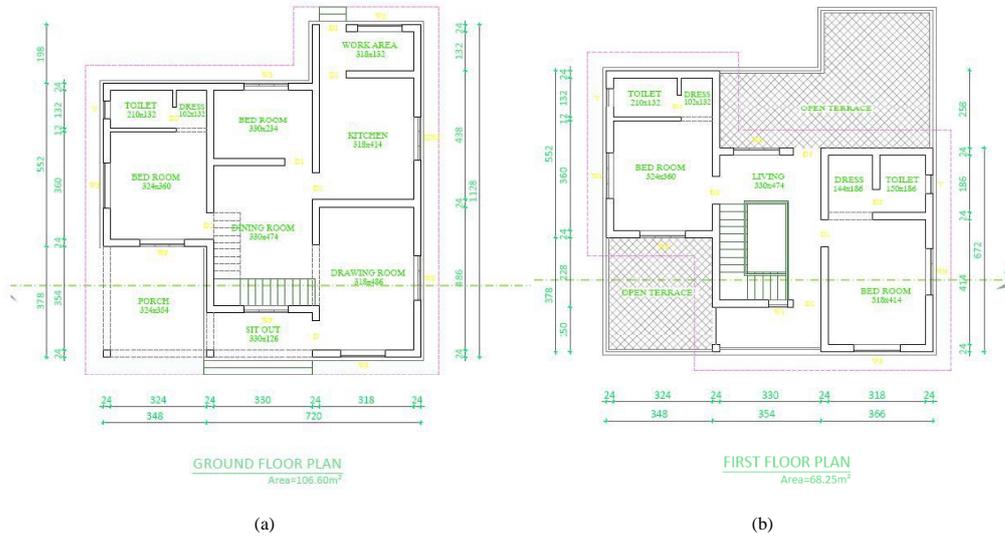


Figure 1. (a) Ground Floor Plan (b) First Floor Plan

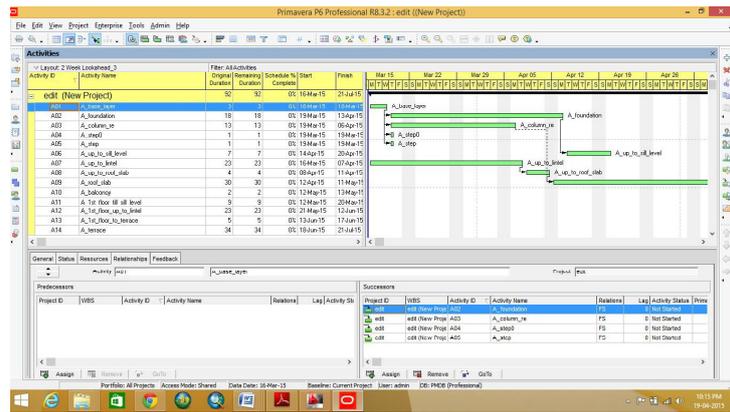


Figure 2. Primavera Schedule

III. 4D MODEL

The 4D model of the residential building was created using ArcGIS. The AutoCAD drawing of the each activity mentioned in the schedule was created and was imported to ArcMap module of ArcGIS in which all the drawings were georefered (so that the drawings were assigned spatial reference) and was then imported to ArcScene module of ArcGIS. In ArcScene the georefered AutoCAD files are converted to shape files (files readable in GIS format) and then the shape files are extruded to the desired height to obtain the 3D model. After the creation of 3d model, schedule from Primavera P6 is imported into ArcScene and is integrated with the 3D model to obtain the 4D model of the building.

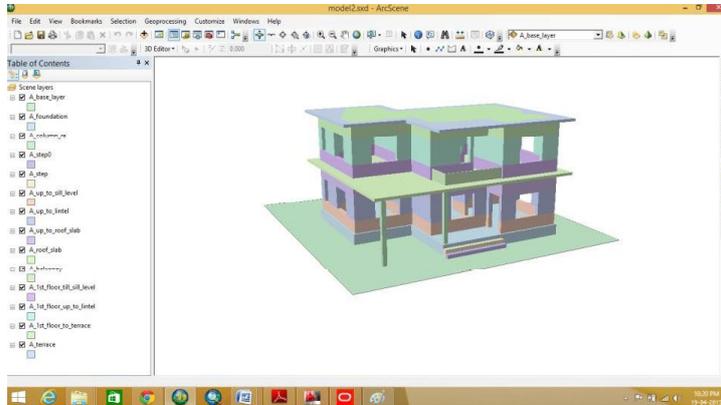


Figure 3. 3D Model In ArcGIS

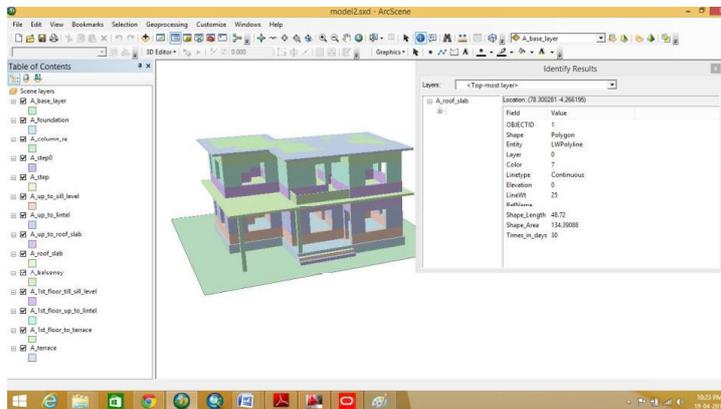


Figure 4. 4D Model In ArcGIS After Time Integration

IV. CONCLUSION

This paper demonstrated the creation of 4D model using GIS, which can act as an alternative for other existing conventional 4D computer aided design tool. This system can be used as a tool for schedule management, planning and effective visualization of the work. The main advantage of the system is that the overlapping and rework can be avoided and thereby reduce delay.

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