International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 05 Issue: 05 | May-2018 www.irjet.net p-ISSN: 2395-0072

Construction Workspace Management using Primavera Software

Chitti Babu Kapuganti[1], Prasanth Mandava[2], Chatragadda Vihar[3], Sagar Sarkar[4], P.V Tagore Reddy[5]

[1]Assistant professor, Department of civil engineering, GITAM Institute of Technology, GITAM Deemed to be University, Visakhapatnam, India.
[2,3,4,5] Under Graduate Student, Department of civil engineering, GITAM Institute of Technology, GITAM Deemed to be University, Visakhapatnam, India.

Abstract - *Construction workspace planning is playing an important role in the development of construction industries. Construction workspaces are generally difficult to proactively plan and manage due to the dynamic nature of a site where workspace requirements keep changing as time evolves. A wide range of planning methodologies have been researched and implemented but they are not qualified enough to satisfy the desire of construction parties and improve the construction performance. There is still an enormous disparity between execution and plan. This paper presents an approach for integrating workspace management within the planning process using primavera software and also helps industries to find a solution for management of workspace.*

Key Words: Construction workspace, workspace management, Primavera software.

1. INTRODUCTION

Construction projects are complex and dynamic in their nature. One of the main constraints that affect the delivery of construction projects is the space available on site, to directly or indirectly execute site activities. Activities on construction sites are usually performed by multiple trades which require, at any point of time, different workspaces such as: working areas for laborers; material storage; equipment, and support infrastructure. This increases the challenges associated with the management of AEWs. The communication of the construction schedule and execution strategy of work-face activities among the project team members is a unique construction problem that takes place at almost all construction sites because the built facility generates complex shapes of occupied workspaces by the executed construction processes, the analysis and communications of the execution space becomes more difficult and critical.

With the growth of information technologies in the field of construction industry over the last years, numerical building information modelling and process simulation has evolved to a fully accepted and widely used tool for project life cycle management. A growing diversity between disciplines, participants, tasks, tools and events while project management in design and construction stages, the rising pressure of costing competition and tighter production deadlines, together with consistently increasing quality requirements and necessity of technological enhancements, have been the driving force of information modelling and numerical simulation in building industry. The range of applications covers virtually every phase of the specific construction product development process, planning, design, estimating, scheduling, fabrication, construction, maintenance and facility management.

Therefore problems caused by teams influence on result of three main project development objectives – time, cost and quality. Today's fast development increases priority of the time target. The project activities' delays cause direct increase of financial losses during construction for contractor. The late commissioning of the building delays cash generation for the customer – financial losses. This delay in addition creates conflict between contractor and customer, which very often lead to long dispute resolutions in the court.

Generally project scope is divided by working packages for different disciplines. Then project team organization gets number of companies with different attitudes, culture and competence in their performance. Therefore coordination and communication between members of the project becomes very complex and difficult. This situation leads to increased risk of errors and omissions and at same time restricted design capabilities. It is evident that overall quality of the building goes to lower grade. In order to further validate the proposed approach, more data is required to verify the generated workspace parameters.

Contractors in India are reluctant to use project planning and scheduling techniques, which are being used all over the world and already proved as benchmark in completion of projects in time. The study deals with discussion/introduction on Primavera P6; a project planning and scheduling tool available in the market. The quality of schedule generated from the software often lacks detail and the purpose of the software in adding value to the project is generally not met by the users in India. In addition to provide insight on various project tasks, their inter-relationships, dependencies to predict total project duration during planning phase. The schedule should be comprehensive enough to let the user understand in detail the purpose of various activities in the schedule.

We as a project team are doing research on how to effectively use construction workspace. By this we can get a way to arrange the multiple trades in order, such that there would be a lucid understanding on the project.

2. Methodology

Primavera P6 allows the scheduler to model the complexity of activity tasks while maintaining the simplicity of the Gantt chart. This is done using Primavera P6's steps function. Activity steps allow the scheduler to break down an activity into smaller units of work that will assist in making a status of the activity when the project starts.

Thus, instead of adding additional activities on the Gantt chart, which increases its intricacy, the activity is left the same on the Gantt chart, but given more definition with the steps function. As the function name implies, activities are broken down into several activity steps.

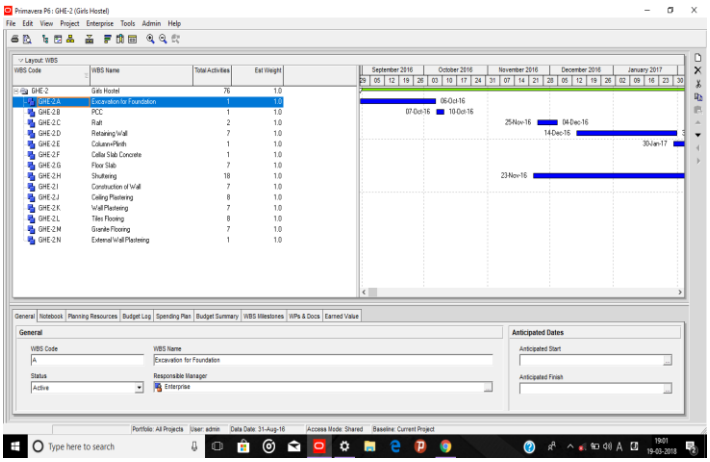

Fig -1: Work Breakdown Structure

The scheduler can assign a weight to each step to apportion its value compared to the other steps. Weights do not need to add up to any particular number either, they just need to represent the portion of the total effort each step will take. Primavera P6 will compute each steps weight percentage.

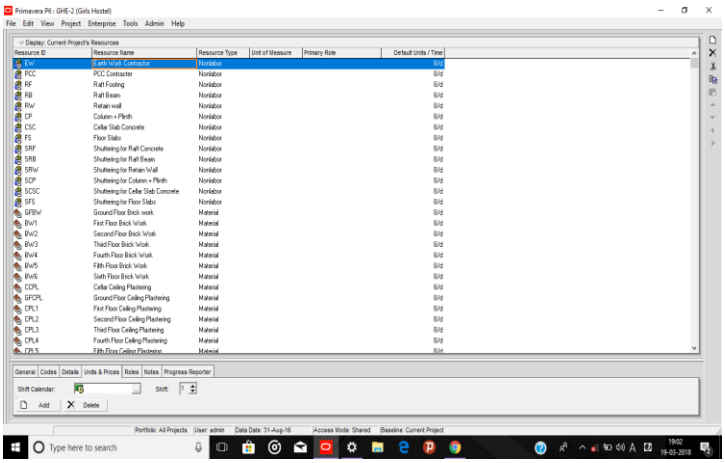

Fig - 2: Resources

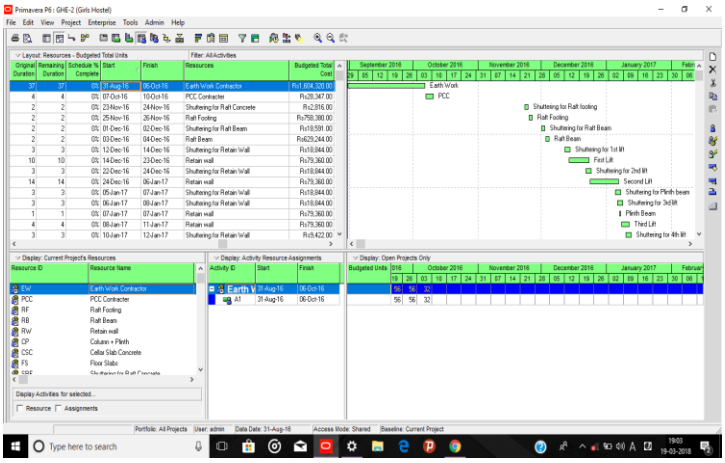

Fig - 3: Activities

After completion of analysing data in primavera software, we take out the required reports from it and calculate the materials which are being used. By doing this we can get exact amount of quantity that is to be consumed in a building construction. We need to schedule this as per required quantity and time.

3. Data Collection

We as a project team have consulted the site engineer and made sure the given data was accurate and took values to validate in the primavera p6software. We have scheduled and took reports form the same.

The scope of data collection is divided into the following step

- Study area characteristics.
    - Preparing actual schedule for the project in primavera.
    - Identifying the constraints in that project.
    - Reducing the constraints which causes delay and prepare new schedule.
- Optimize the labour resources to reduce the cost of the project.
- Find the workspace available.
- Allotment of workspace.
- Collection of Report for every 2 weeks for the workspace assigned.
- Report must be taken for each and every material.

Fig - 4: Site (Top View)

4. Data Analysis

Proper scheduling of the project must be done after workspace allocation. Each material is calculated as per the guidelines for every 2 weeks.

We have taken these materials and analysed them for 1 month near the site.

Table -1: Materials and their space requirement

Material	Space Requirement
Cement	4.9 m3 : 2x2.5 m2 area
Sand	155 m2
Bricks	145 m3 : 100 m2 area
Office Containers	2 x (3x10) m2
Quality Control Room	3x10 m2
Shuttering Material	150 m2
Steel Reinforcement	20x6 m2 area
RMC Equipment	18x10 m2 area

The Biweekly data has been calculated as shown in the above table. This gives the minimum workspace required for stacking of the materials, working on the materials and for their further usage in the project. Usually materials stacked upon each other upto a height of 1.5 m taking an average human's height as reference.

A cement bag usually of volume 0.034cubic metres and has a weight of 50 kg can be accumulated at a height of 1.5 m. The Project site involved for this study used a container of 3m x 5m x 2m which is more than sufficient for holding a biweekly cement material of 4.9 m^3.Sand usually requires an area of 15 m^2 for dumping 6m^3 volume.

AAC bricks used for this project takes up a space of 145 m^3. An AAC block size is around 0.6 x 0.2 x 0.2 m3, which says that when a height of 1.5 m is assumed the surface area covered by AAC blocks would be around 100 m^2.

Office containers used for this project are of size 10 x 3 m^2. Quality control room is setup in containers with required experimental devices bought for this project.

Shuttering materials are usually custom made for a certain project depending upon the requirements. So a minimum space of 150 m^2 is considered for this project. Steel reinforcement dumping and working takes place in a minimum space of 20 x 6 m^2 area with safety in mind. RMC Equipment and its working takes place in a space of 18 x 10 m^2.

Fig - 5: Materials stored in unorganised manner - 1

Fig - 6: Materials stored in unorganised manner - 2

Fig - 7: Materials stored in unorganised manner - 3

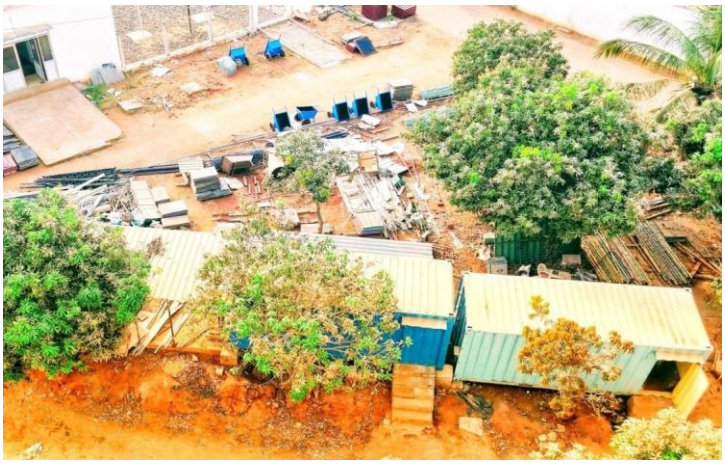

Fig - 8: Utilization of place by installing offices in the near vicinity

5. CONCLUSIONS

The conclusions of the study are:

1. Proper scheduling of activities is possible by using Primavera P6.
2. Quantities and volumes of materials required biweekly can be calculated using Primavera P6.
3. Time frequencies of refilling the materials can be done.
4. Efficient usage of workspace is possible using these techniques.

REFERENCES

[1] Impact of 4D Modeling on Construction Planning Process, Master of Science Thesis in the Master Program of Design and Construction Project Management, DUNG THI PHUONG DANG,MOIZ TARAR, © DUNG DANG, MOIZ TARAR 2012.

[2] Development of a 5D BIM based management system for building construction, GordanaBlažević A, MladenVukomanović B, MladenRadujković, C, a.b.c Faculty of Civil Engineering, University of Zagreb, Zagreb 10 000, Croatia.

[3] Dermot Kehily& Jason Underwood (2017). Embedding life cycle costing in 5D BIM. Journal of Information Technology in Construction (ITcon), Vol. 22, pg. 145-167, http://www.itcon.org/2017/8.

[4] 5D Building Information Modelling – A Practicability Review - Xia Sheng Lee ,a, Cheah Wei Tsong and MohdFarisKhamidi, School of the Built Environment, University of Reading Malaysia, PersiaranGraduan, Kota Ilmu, Educity, 79200 Nusajaya, Johor, Malaysia. UniversitiTunku Abdul Rahman, Jalan Sungai Long, Bandar Sungai Long, Cheras, 43000, Kajang, Selangor, Malaysia.

[5] Developing an Efficient Schedule in Primavera P6: Significance of Activity ID & Descriptions, Satinder Chopra, Arvind Dewangan P.G. Student, Department of Civil Engineering, HCTM Technical Campus, Kaithal, Haryana, India, Associate Professor, Department of Civil Engineering, HCTM Technical Campus, Kaithal, Haryana, India.

[6] Amr Sourani, Muhammad Sohail (2009); Barriers to Addressing Sustainable Construction in Public Procurement Strategies; ICE Publishing (2010).