



## Implementation of Planning Techniques for A Residential Project using PRIMAVERA

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### ABSTRACT

With the onset of High Rise Buildings in metropolitan cities, planning and scheduling has become a major concept to be considered for a smooth execution of construction works. Completing a project within the scheduled time frame and estimated cost is the most challenging task any modern construction manager faces. Whenever he accomplishes this task effectively and efficiently then only the project is said to be successful one. Oracle's Primavera P6 is an effective tool for determining an ideal schedule for construction activities. This project serves as a perfect reference frame for scheduling different High Rise Buildings. All the important steps like creating an EPS, creating a WBS, linking of activities according to their interdependence and availability of resources, reduction of float values, and determination of Critical Path are clearly exhibited in this report.

**Keywords— Planning, Scheduling, High Rise Buildings, Primavera, Critical Path, Gantt Charts.**

### I. INTRODUCTION

Tall buildings throughout the world are becoming popular day by day. With the advent of modern day construction technology and computers, the basic aim has been to construct safer buildings keeping in view the overall economics of the project. A high-rise building, apartment tower, office tower, apartment block, or block of flats, is a tall building or structure used as a residential and or office use. Due to an increasingly competitive environment, construction companies are forced to be more efficient and achieve competitive operational advantage. Companies are

always looking for improvements in equipment features, communication tools, efficient management techniques, and training human resources. Construction companies are also narrowing their focus, becoming specialists in certain types of construction projects. This specialization requires more focused project planning and controlling techniques that prove to be better for certain type of projects while providing specialized construction services. The benefits of effective planning, scheduling and control of construction projects are: reduced construction time, reduced cost overruns.

Planning is the process of identifying all the activities necessary to successfully complete the project.

Scheduling is the process of determining the sequential order of the planned activities, assigning realistic durations to each activity and determining the start and finish dates of each activity. The process of converting a general or outline plan for a project into a time-based graphics presentation given information on available resource and time constraints.

Construction Planning is the necessary forerunner to scheduling and it includes:

- defining work tasks
- determining general sequence
- defining construction methods
- assigning responsibility

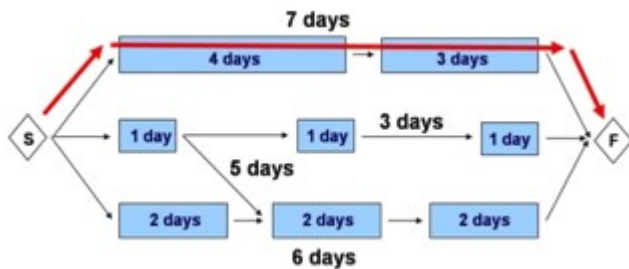
**CPM:**

The Critical Path Method (CPM) is one of several related techniques for doing project planning. CPM is for projects that are made up of a number of individual "activities." If some of the activities require other activities to finish before they can start, then the project becomes a complex web of activities.

CPM analysis starts after you have figured out all the individual activities in your project.

The critical path method (CPM) is a duration-driven technique in which the basic inputs are project activities, their durations, and dependence relationships. Activity durations are functions of the resources required (rather than available) to complete each activity. The CPM formulation assumes that resources are not restricted in any sense.

CPM analysis tools allow a user to select a logical end point in a project and quickly identify its longest series of dependent activities (its longest path). These tools can display the critical that flows from the project's start (or current status date) to the selected logical end point. Fig: 1 CPM diagram (Source Google)



Critical path drag analysis has also been used to optimize schedules in processes outside of strict project-oriented contexts, such as to increase manufacturing throughput by using the technique and metrics to identify and alleviate delaying factors and thus reduce assembly lead time.

**Bar Chart:**

The bar chart was originally developed by Henry L. Gantt in 1917 and is called a Gantt chart.

A bar chart is —a graphic representation of project activities which are shown in a time-scaled bar line with no links shown between activities (Popescu and Charoengam, 1995). It quickly became popular in construction industry because of its ability to graphically represent a project's activities on a time scale. A bar chart has become a vehicle

for representing many pieces of a project's information. A project must be broken into smaller, usually homogeneous components, each of which is called an activity or task. Bar charts basically use the x-axis to depict time, and the y-axis is used to represent individual activities.

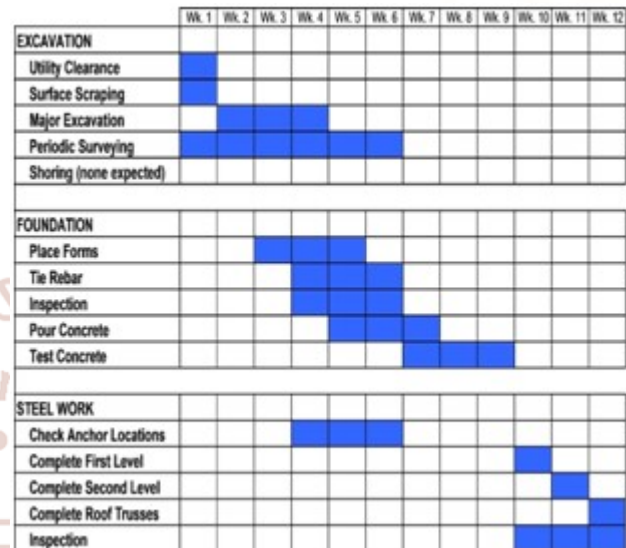


Fig: 2 Bar Chart (Source Google)

**Network Scheduling Techniques:**

The limitation in the bar chart called for the need to develop new technique in scheduling. Network techniques are either deterministic or probabilistic.

**Deterministic Network Scheduling Technique:**

The Arrow Diagram Method (ADM) and the Precedence Diagram Method (PDM) are the two deterministic network techniques available.

In, ADM activities are represented by arrows and then connected to nodes. In, PDM activities are the nodes themselves and the arrows represent the job logic.

**Probabilistic Network Scheduling Technique:**

As far as possible network scheduling techniques are concerned, the Program Evaluation and Review Technique (PERT) considers three different duration for each activity, the most optimistic time, the most likely and the most pessimistic time duration. This characteristic enables the scheduler to model the uncertainty associated with the duration of each activity.

**Advantages:**

- Network show logic, the relationships among the activities. Bar charts do not Networks can better represent large and complicated projects.
- Networks can estimate, or predict, the completion date of the project, or other dates, on the basis of mathematical calculations of the CPM.

**Limitation of Network Scheduling Technique:**

- It does not take into account the learning curve effect.
- For complex project it is very extremely complex and detailed.
- It is observed that field personnel, who are not actually trained to understand the methodologies of network scheduling, get confused by complex schedule.

**II. LITERATURE SURVEY**

**Andrew Fernans Tom, Sachin Paul Lecturer published paper in IJIRSET 2013.** The main objective of this study was to understand the role of monitoring and control in the progress and timely completion of a construction project. This objective was achieved through revision of literatures and methodologies involved in monitoring and control. The case study proved to be a guideline in understanding the progress of construction work and also to identify the specific problems arising during the process. Results of this study show the drawbacks of the present project management system in construction project and the importance efficient planning, monitoring and controlling, as well as the need and Effectiveness of project management software like Primavera P6 in a construction.

**Tarek Hegazy, M.ASCE1; and Wail Menesi, S.M.ASCE2 published paper in ASCE 2008** This research introduces enhancements to a computerized schedule analysis model so as to yield accurate and repeatable results. Theoretical base for this method is traditional window analysis which presents improvements to the daily window analysis method. The resultant modified daily window analysis considers the multiple baseline and resource allocation effects on daily analysis. The model uses a daily window size in order to consider all fluctuation in the critical path and uses a legible representation of progress information to accurately a portion delays

and acceleration along project parties. This research is useful for repeatable analysis of construction project in order to enable corrective actions and claim analysis.

**Sushant pradhan (2014)** Every construction industry expression a stiff struggle in every section of project, be it technique, equipment, methodology or management. The goals are been created and the level is getting higher. Construction Industries involve themselves in frequent projects and also aim for higher yield as financial benefit is the ground certainty. The task becomes tougher when one indulges to maintain customer satisfaction i.e. quality and duration at the same time. Rarely have the companies failed to attend the assure. Companies in the past have faced a lot of problems particularly when it comes to multiple projects. The data are stuffed, the cost has been overrun, the duration is extended and the resources have been over-allocated. Thus resulting in inappropriate project management.

**Veena H.C(2015)**Resource management is one of the most vital aspects of construction project management in today's economy since the construction industry is resource exhaustive and the costs of construction resources have gradually, risen over the last several decades. These techniques help to reduce project duration use of unlimited availability of resources for completion of a project. Through it is observed that resources are limited in real project situation. It has been observed that the project delays occur due to inadequate supply of resources. In large scale projects, preparing a correct and workable plan is very difficult. Project management software like MS Project and Primavera project planner are used in construction industry. The main aim of this study is to analyze the schedule control techniques by constraints and activity types is done using primavera software for an apartment building.

**Raj saran(2015)** Planning and scheduling is very significant in construction projects because of the increasing complexities in this field. Construction Planning is the necessary predecessor to Scheduling and includes major work tasks, determining universal series, construction methods and conveying tasks. Improper planning can lead to most important delays in the project work. Projects nowadays huge amount of paperwork, which makes the management very bulky. These problems can be solved using a project planning software which helps to give a structured

move toward to planning. In this study, a case of a two storey research lab has been taken to demonstrate how proper planning and scheduling is done using Primavera software.

**J. Jayalakshmi(2014)** ,This study compared time performance of the conventional method of construction for high- rise residential and Industrial Building System (IBS) method by overall construction period . The scheduling was developed using Primavera project planning software. The positive changes include creating a healthy working environment among those involved directly in the construction industry. The major players in the are architects, engineers, town planner, developer, contractor and the supplier or manufacturer have to play their roles in enhancing their working system, management and administration to enable the modernization in the industry.

### III. DISCUSSION

Primavera software has been extensively used for Planning and Scheduling of our project. The schedule has been so constructed that the activities which are interdependent of one other start together, hence saving a commendable amount of time in the construction process. It has been looked after that activities like Brickwork, Plastering, Painting, Tiling, Sanitation and Electrical works are so linked that there is no considerable float or wastage of time. The following Plan has been considered by us for Planning and Scheduling of Project via Primavera. For the purpose of planning and scheduling, we made our own plan and elevation to make our project unique. As it is not similar to any ongoing projects, we have made a list of all the activities by doing extensive surveys and interviews with the professionals

The following steps are included in the process of scheduling via Primavera:

#### Creating EPS:

The EPS is a hierarchy used to organize projects, and to associate Organizational level security with that project structure.

When you create the enterprises project structure, you must identify an OBS element, or person responsible for each node and project within EPS.

A default root node displays in the top left position in the hierarchy. All project listed below it are the part of

same structure. You can also define multi root nodes to separate various component of your of your enterprises. For example, you might want to exclude inactive or what-if project from the main enterprises. To define root node, click the left arrow key to move an EPS element to top left position in the hierarchy, and then add the hierarchy of project below this node. Firstly we had created the EPS of our project i.e. Enterprise Project Structure.

#### Steps:

- 1) From the Enterprise column select EPS.
- 2) Create a new EPS by giving proper name and ID.
- 3) Go in project select the created EPS and add new project.
- 4) From the file command select New.
- 5) There will a dialogue box of select an EPS, select the created EPS.
- 6) Give a name and an ID to the project.
- 7) Specify start and must finish date of the project.
- 8) Select a responsible manager for the project.
- 9) Assign the rate type of the items.
- 10) It will ask for project architect, Yes or No if we are only planning then select No option. In this way the project has been successfully created.

#### Creating WBS:

The work breakdown structure (WBS) is a hierarchical system that represents the construction project in increasing levels of detail to define, organize and display the project work in measurable and manageable components.

One of the first steps in planning a project is to break down the project into its major deliverables i.e. major product or service components. This is known as the Work Breakdown Structure (WBS). After you have created the WBS, you can then create the activities required to achieve those deliverables.

Primavera P6 encourages you to create a work breakdown structure (WBS) at the beginning of the project. This is known as a top down approach. Primavera P6 recognizes the importance of the project management team keeping their “eye on the ball” throughout the project life cycle. This means that you maintain a focus on the end product or service, which is the whole purpose of the project.

The WBS helps you maintain this focus on the product. At its heart the WBS is a deliverable-oriented

decomposition of the project into smaller components. So the WBS focuses on the deliverables, and it is simply a breakdown of all the components making up the product in a hierarchical fashion. Primavera P6 has you create the WBS first, so that the activities on the project schedule flow from the WBS in a top down method, and not the other way around.

#### Steps:

- 1) Click on WBS on left side in the directory.
- 2) Select the project in WBS section.
- 3) Start adding the WBS namely, Milestone, Engineering, Procurement etc.
- 4) Go in project, select the project and open it, it will open in activities section.

#### Creating Calendar and Activities:

Before assign activities firstly we have to create a calendar for the project. You can create and assign calendars to each resource and each activity. This calendar defines the available work hours in each calendar day. You can also specify national holidays, your organization's holiday, project specific work or non-work days, and resource vacation days.

- Calendars are assigned to activities, not projects.
- Calendars have 3 different time levels to work with
- Primavera P6 Calendars come in 2 flavors – Activity and Resource.
- Changing an Activity's Calendar can sometimes mess up your Duration

#### Steps:

- 1) From enterprises column select calendar.
- 2) Create a project calendar, for the current project.
- 3) Assign it default calendar for the project.
- 4) Now start adding activities to created WBS in project.
- 5) Start linking activities by assign the Predecessor and Successor to each activity.
- 6) Give relation to each activity namely, FS, SS, SF, FF.

#### Creating Resources:

Now we will allot the resources to activities.

#### Steps:

- 1) Select resources option from directory.
  - 2) Start creating resources which will be require for our project.
  - 3) Assign proper resource type i.e. labour, non-labour and materials.
  - 4) Assign default resource calendar and default units/time and price/unit.
  - 5) Start assigning the resources to the activities.
- Now **SCHEDULE** the project (F9+Enter).

#### CONCLUSION

- Now-a-days project planning & scheduling for a medium scale to large scale project is a necessity.
  - 1) We can get exact duration, resources required for a project well in advance. There are various planning and scheduling techniques
  - 2) Critical Path Method
  - 3) PERT
  - 4) Bar Charts
- Various Software are applicable planning and scheduling
  - 1) PRIMAVERA
  - 2) MSP
  - 3) MS Excel
- Delay analysis can be done using PRIMAVERA Software.
- Co-relation between various activities can be found out and co-existence of various activities can be planned to save construction time

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