

# PLANNING AND SCHEDULING OF HIGH-RISE COMMERCIAL BUILDING USING MICROSOFT PROJECT

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**ABSTRACT:** Project planning is integral part of project management, which correlates to the effective use of scheduling tools such as Gantt charts to plan and subsequently preparing report progress with in the project environment. Initially, the project scope is defined and the appropriate methods for completing the project are determined. Following this step, the duration for the various tasks necessary to complete the work are listed and grouped into a work breakdown structure. Project planning is often used to organize different areas of project, including project plans, workloads and the management of teams and individuals.

Construction Firms in India, Construct the Projects in a traditional way, this sometimes proves Uneconomical & Tedious too. Traditional way also proves to be Time Consuming and Confusing. The presented work will provide them an Opportunity to clearly observe the advantages of Microsoft Project (MSP) which speeds up Construction and also make the Project Cost Effective with Proper Planning with the help of the case study of a project which is being executed in India.

In present project work, I have taken a high-rise commercial structure. I have done the detailed estimate by using the plans and drawings that are given by the site officials, calculated the total duration of the project and scheduled the tasks or activities by using Microsoft project software.

## 1. INTRODUCTION

Planning can be thought of as determining "what" is going to be done, "how", "when" by "whom", and "when." In construction projects the "plans" (blueprints) and specifications for the project generally define both the end product and, often, the general time frame in which the time and material required to complete a project. However, they normally do not specifically identify the individual steps, their order, and the timing followed to achieve the end product. Thus, when we discuss planning in the construction process, we must address the "how" and, therefore, the "what," "when," "where," and "who."

When we discuss scheduling, we are usually interested in some aspect of the time element of the plan. In essence, a schedule may be a timetable of activities, like of "what" is going to be done or "who" is going to be working on specified tasks. Such a timetable are often

checked out in two ways: the primary is that specialize in an activity, like determining "when" a particular task is going to be performed relative to other activities. The second is concentrating on a specified time-frame then ascertaining "who" is going to work (or needed) or "what" should be occurring at a specific time. All people are involved in planning and scheduling on an ongoing basis. The degree to which we feature it out and therefore the techniques we use vary depending upon the complexity of our, situations and our needs and objectives.

Planning and scheduling are basic to most things we, as humans, do. Planning is the way organizes and sequence the tasks needed to accomplish a goal. There are plans for meeting common goals, such as getting to work on time, and more formal plans, such as those used by companies (such as a strategic plan, business plan, financial plan & marketing plan). The planning required to construct an office building requires the identification of the tasks needed to complete the building and then the sequencing of those tasks in their logical order. Scheduling is one component of the plan and aids in visualizing the plan.

The scheduling part of the construction plan requires that the tasks or activities are assigned a duration corresponding to the anticipated productivity of the crews doing the work. When each tasks having specified durations and are organized to put in a particular order by defining the relationships they required with each other, a construction schedule is crated. Scheduling is just one a component of construction planning & Management, which can also include plans for safety, Community relations, material and handling, and environmental protection along side the schedule to make the general construction plan. The construction schedule has many uses, beginning with its representation of the initial construction plan. To be effective, plans must be monitored for progress. A comparison of the progressed, or update, schedule with the project baseline, or original, plan enables the manager to identify problems early. Adjustments can be made when needed, and the effect of proposed changes can be simulated in the schedule, so that the result can be assessed.

Project Management is that the Application of data, skills and Techniques to project activities to satisfy project requirements. It's a strategic ability to try and do something successfully for organizations, enabling them to patch the project results to Organizational goals and thus, better compete in their markets. It are often also defined because the process and activity of designing, organizing, inspiring, and controlling resources, procedures and protocols to realize specific goals in scientific or daily problems. A project may be a temporary aim designed to supply a special product, service or result with an outlined starting and end (usually time-constrained, and sometimes constrained by funding or deliverables), undertaken to satisfy eccentric goals and objectives, typically to cause beneficial change or added value. The temporary nature of projects stands in contrast with business as was common (or operations), which are recurring, permanent, or semi-permanent functional activities to supply products or services. In implementation, the management of those two systems is usually quite distinct, and intrinsically requires the event of divergent technical skills and management strategies. It always been practiced casually, but began to evolve as a major profession within the mid-20th century.

### 1.1 Project Management

Project management cares with the general planning and co-ordination of a project from conception to completion aimed toward meeting the stated requirements and ensuring completion on time, within cost and to required quality standards.

Project management is generally reserved for focused, non-repetitive, time-limited activities with a point of risk which are beyond the standard scope of operational activities that the organization is responsible.

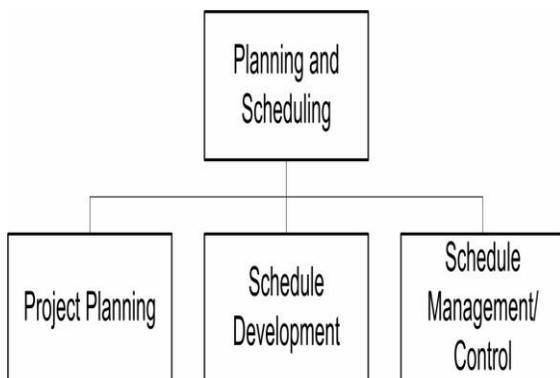


Figure 1 - Basic Project Management

#### 1.1.1 What is a project?

“A project may be a one-shot, time-limited, goal-directed, major undertaking, requiring the commitment of various skills and resources”.

A project may be a temporary endeavor undertaken to make a novel product or service. A project is temporary in this there's an outlined start (the decision to proceed) and an outlined end (the achievement of the goals and objectives). Ongoing business or maintenance operations aren't called as projects. Energy conservation projects and process improvement efforts that end in better business processes or more efficient operations are often defined as projects. Projects usually include constraints and risks regarding cost, schedule or performance outcome.

A project represents a singular set of activities that has got to happen to supply a singular product. The success of a project is judged by meeting the standards of cost, time, quality, safety, and resource allocation.

#### 1.1.2 What is project management?

The purpose of Project Management is to achieve goals and objectives through the planned expenditure of resources that meet the project's quality, cost, time, and safety requirements.

#### 1.1.3 Importance of Project Management

Project gets started at the right way but as it proceeds further, gets off the track. Owing to this its important to manage the activities in the right way, thus project management plays a vital role in arranging the critical activities of the project which is called as task to function in the appropriate way. Project Management aid the project in better efficiency to deliver services.

### 1.2 Four Basic Elements of Project Management

A successful Project Manager must simultaneously manage the four basic elements of a project: resources, time, cost, and scope. Each element must be managed effectively. Of these elements are interrelated and must be managed together if the project, and therefore the project manager, to achieve success.

#### 1.2.1 Managing Resources

A successful Project Manager must effectively manage the resources assigned to the project. This includes the labour hours of the project team. It also includes managing labor subcontracts and vendors. Managing the people resources means having the proper people, with the proper skills and

therefore the proper tools, within the right quantity at the proper time. However, managing project resources frequently involves quite people management. The project manager must also manage the equipment (cranes, trucks and other heavy equipment) used for the project and therefore the material (pipe, insulation, computers, manuals) assigned to the project.

### 1.2.2 Managing Time and Schedule

Time management may be a critical skill for any successful project manager. The foremost common explanation for bloated project budgets is lack of schedule management. Fortunately, there's tons of software on the market today to assist you manage your project schedule or timeline.

Any project are often weakened into variety of tasks that need to be performed. To organize the project schedule, the project manager has got to find out what the tasks are, how long they're going to take, what resources they require, and in what order they ought to be done.

### 1.2.3 Managing Costs

Often a Project Manager is evaluated on his or her ability to finish a project within budget. The prices include estimated cost, actual cost and variability. Contingency cost takes under consideration influence of weather, suppliers and style allowances.

### 1.3 Project Management Life Cycle

The process flow of Project management processes is shown in Figure 2.

The various elements of project management life cycle are

- Need identification
- Initiation
- Planning
- Executing
- Controlling
- Closing out

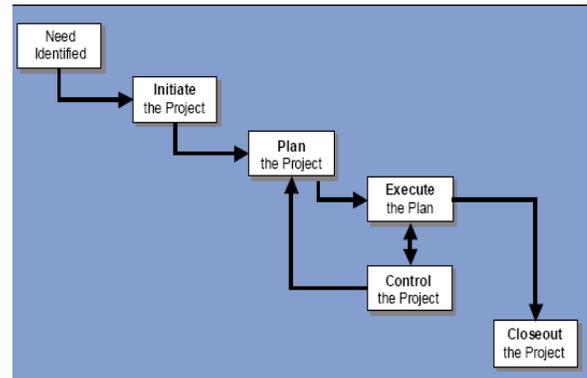


Figure 2 -PROJECT MANAGEMENT LIFE CYCLE

## 2. PROJECT DETAILS

### 2.1 Details of the Project:

Stakeholders Involved:

Client: GAR Corporations Private Limited

Contractor: Metro build Projects Private Limited

PMC: TUV India Private Limited

Architectural Consultant: RSP Design Consultants India Private Limited

Structural Consultant: Design Tree Service Consultant

Plumbing Consultant: Design Tree Service Consultant

### 2.2 Project Brief:

Total Built up Area:	21,00,000 square feet
Area:	5.50 Acres
Duration:	30 months
Start date:	04-09-2019
Date of commencement:	07-10-2019
End date:	01-02-2022
Total cost:	150 Crores

Name: GAR Laxmi Infobahn Tower-7

Location: Kokapet, Hyderabad

Duration: 30 Months

Owner: GAR Corporations Private Limited

Floors: 5 Basements + Ground + 32 floors

Height: 146.5 Mtrs

Usage: Commercial

Basement 01 clear height= 4.900mts

Basement 02 clear height= 3.150mts

Basement 03 clear height= 4.100mts

Basement 04 clear height= 4.100mts

Basement 05 clear height= 4.100mts

Floor to floor clear height= 4.050mts

**2.3 Strategic Location:** Location of the project is Kokapet, Hyderabad. This location is surrounded by many facilities which made it a great location for construction.

GAR LIB Tower-7 is

- Adjacent to Outer Ring Road,
- Adjacent to Wave rock,
- Close to Gachibowli sports stadium,
- Close to Financial District,
- Close to TCS Synergy park, close to ISB, Infosys, Microsoft and Multinational IT Companies.

**In one word it is in the “Heart of Hi-tech”.**

#### 2.4 Specifications:

- **Structural specifications:** RCC Column framed structures & PT Slabs are used to withstand wind and seismic loads, concrete blocks are used in the non-structural members in the super structure.
- **Lifts:** Thirty-Six speed automatic passenger lifts with rescue device, Four service lift cum high speed automatic passenger with rescue device.
- **Parking management:** Parking is designed in such a way that it facilitates the maximum number of cars in all five basement floors.
- **Fire and Safety:** Fire alarms and public address systems in every floor including parking areas, exclusive water softening plant for domestic water.

#### 2.5 Amenities:

- Water, Drainage and Electricity
- Gymnasium
- 24×7 Security
- Power backup
- Land scape Gardens
- Swimming Pool
- Indoor Games
- Rain water harvesting

Multipurpose Conference Hall

### 3. MICROSOFT PROJECT

#### 3.1 Project Management Software

Project management software has the capacity to assist plan, organize, and manage resource pools and develop resource estimates. Counting on the sophistication of the software, it can manage estimation and planning, scheduling, cost control and budget management, resource allocation, collaboration software, communication, decision-making, quality management and documentation or administration systems.

Project management scheduling software is widely used to assist with schedule development. Other software could be capable of interacting directly or indirectly with project management software to hold out the wants of other Knowledge Areas, like cost estimating by period of time and schedule simulation in quantitative risk analysis. These products automate the calculation of the mathematical aerial and backward pass critical path analysis and resource leveling, and, thus, leave rapid consideration of the many schedule alternatives. They're also widely used to print or display the outputs of developed schedules. "Time is money" so Proper Scheduling is extremely important for the project to optimize the resources as per availability.

#### 3.2 About Microsoft project:

Microsoft Project may be a project management software program developed and sold by Microsoft, which is meant to help a project manager in developing an idea, assigning resources to tasks, tracking progress, managing the budget, and analyzing workloads. Project creates budgets supported assignment work and resource cost. As resources are assigned to the task and therefore the program calculates the value adequate to the work times the speed, which rolls up to the task level then to any summary tasks level and eventually to the project level. Resource definitions (Labour, equipment and materials) are often shared between projects employing a shared

resource pond. Each resource can have its individual calendar, which defines what days and time is resource present. Resource rates are used to calculate resource assignment costs. Each resource is often assigned to multiple tasks in multiple projects and every task is often assigned numerous resources. The execution of the scheduled task work supported the resource availability as defined within the resource calendars. All resources are often defined in Work, Material and price.

Therefore, it cannot estimate what percentage finished products are often obtained with a given amount of raw materials. This makes Microsoft Project unsuitable for solving problems of obtainable materials constrained production. The appliance creates critical path schedules, and important chain and event chain methodology third party plug-ins also are obtainable. Schedules are often resource leveled, and task networks are visualized during a Gantt chart. Additionally, Microsoft Project can identify divergent classes of the users. These different classes of users can have differing access levels to projects, views, and other data. Customization of aspects in Microsoft Project like calendars, views, tables, filters, and fields are stored in an enterprise global which is accessible by all users.

### 3.3 Work Breakdown Structure (WBS)

A Coding Structure to permit Reporting for Specific Areas or Trades. Work breakdown structure may be a process of dividing the project task into smaller manageable components for planning purpose. A project is formed manageable by first breaking it down into individual component during a hierarchical data structure, referred to as the work breakdown structure (WBS).

The WBS is that the structure which defined task, facilitating resource allocation, assignment of responsibilities and measurement and control the project. The WBS is widely employed by the project manager as a tool within the planning activity for the development project.

## Work Breakdown Structure

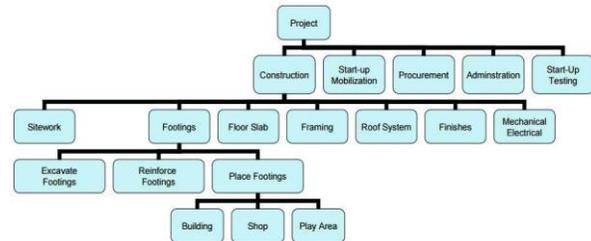


Figure-3 Work Breakdown Structure

## 4. SCHEDULE COMPRESSION

Schedule compression shortens the project schedule without changing the project scope, to satisfy schedule constraints, imposed dates, or other schedule objectives. Schedule compression techniques include:

**4.1 Crashing:** - Project crashing may be a method for shortening project duration by reducing one or more critical activities to a time but normal activity time. Crashing achieved by devoting more resources to crashed activities. Schedule compression technique during which cost and schedule tradeoffs are analyzed to work out the way to obtain the best amount of compression for the smallest amount marginal cost. Crashing doesn't always produce a viable alternative and may end in increased cost.

- Project duration are often reduced by assigning more resources to project activities.
- Doing this however increases project cost.
- Decision is predicated on analysis of trade-off between time and price.

### 4.2 Four Steps to Project Crashing

1. Find the traditional critical path and identify the critical activities
2. Compute the crash cost per week (or other time period) for all activities within the network using the formula.

$$\text{Crash cost/Time period} = \frac{\text{Crash cost} - \text{Normal cost}}{\text{Normal time} - \text{Crash time}}$$

3. Select the activity on the critical path with the littlest crash cost per week and crash this activity to the utmost extent possible or to the purpose at which your required deadline has been reached

4. Check to make certain that the critical path you were crashing remains critical. If the critical path remains the longest path through the network, return to step 3. If not, find the new critical path and return to step 2.

**4.3 Relationship of Time and Cost:**

The project duration effects on the value of the project resources. Reducing the time of the non-critical activities includes the extra float thereupon the value of the project are going to be increase. Explanation of the project cost.

**4.3.1 Project Indirect Costs**

- Costs that can't be related to any particular work package or project activity.
- Supervision, administration, consultants, and interest
- Costs that change (increase) with time.
- Reducing project time directly reduces indirect costs.

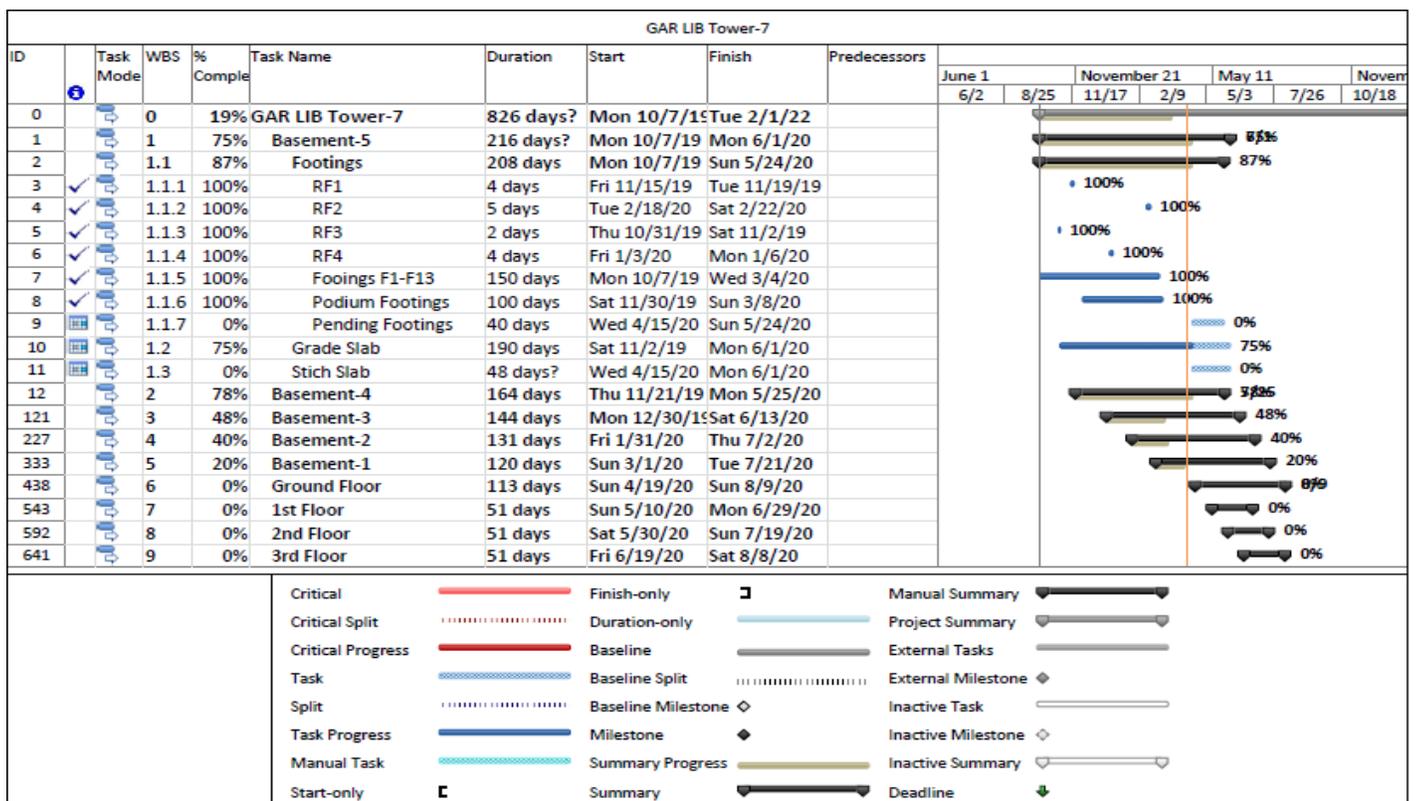
**4.3.2 Project Direct Costs:**

Normal costs which will be assigned on to a selected work package or project activity

- Labour, materials, equipment, and subcontractors
- Crashing activities increase direct costs.
- Reducing Project Duration to scale back Project cost

Project Crashing and Time-Cost Trade-Off General Relationship of your time and price.

- Project crashing costs and indirect costs have an inverse relationship.
- Crashing costs are highest when the project is shortened.
- Indirect costs increase because the project duration increases.
- Optimal project time is at minimum point on the entire cost curve.



## DISCUSSION ON RESULTS

Projects are a way of organizing activities that can't be addressed within the organization's normal operational limits. Projects are, therefore, often utilized as a way of achieving an organization's strategic plan, whether the project team is used by the organization or may be a contracted service provider. Top quality projects deliver the specified product, service or result within scope, on time, and within budget.

Time Management processes concerning the timely completion of the project. It consists of the Activity Definition, Activity Sequencing, Activity Resource Estimating, Activity Duration Estimating, Schedule Development, and Schedule Control project management processes in this Project by using the project management software "Microsoft project" scheduling is done for 5B+G+32 floors Commercial apartment. The total construction period is scheduled for 28 months. The schedule result of the project in MSP Gantt chart view is provided above. The results of this study confirm that construction professionals are heavy users of PM software and differ from the respondents in the overall study concerning their usage patterns. In general, construction professionals tend to have more project experience and education than PM professionals as a whole. The construction respondents also spend more time in PM and work on slightly fewer projects than other PM professionals.

Another distinguishing characteristic is that the construction professionals tend to work on typical projects that have larger numbers of activities and resources. The software package of choice among most construction respondents is Microsoft Project.

## CONCLUSIONS

We can conclude that there is difference between the theoretical and practical work done. As the scope of understanding will be much more when practical work is done. As we get more knowledge in such a situation where we have great experience doing the practical work. Construction projects are, by nature, difficult to regulate due to their dynamic and sophisticated environment, leading to frequent changes, delays, and price overruns. The power to assess the impact of site events on construction projects is significant within the preparation and settlement of claims.

Knowing the Estimated quantity of work, we have designed the time schedule depending upon the time duration method - Optimistic time (To) Most likely time (Tm) and Pessimistic time. In project Management time,

cost and scope are most important aspects which called triple constraint. Effective time schedule optimizes the resources in the project. Construction contractors control their contracts' detailed schedule progress. The project manager focus is the big picture, the master schedule, to manage interfaces between contractor third party, and Agency construction activities. Your approach to master schedule control depends on the project's size and complexity. To complete a project successfully with in time and without increase in cost, sound scheduling system is needed.

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