



PLANNING SCHEDULING AND TRACKING OF RESIDENTIAL BUNGALOW USING MSP

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Abstract: This paper discusses the use of Microsoft Project software and construction management techniques for planning, scheduling, and tracking a residential bungalow project. The project involves building a custom bungalow from scratch, which requires careful planning and scheduling to ensure timely completion within the allocated budget. This study aims to demonstrate the benefits of using project management software for residential construction project

Keywords: Microsoft Project software, planning, scheduling, tracking

1. INTRODUCTION

The construction industry is an integral part of India's infrastructure and economic development. It faces many challenges, such as time and cost overruns due to poor design, poor planning, lack of commitment and quality control. Management skills are important to complete the work on time, and there should be some kind of reporting mechanism to remind the organization of its success and failure. Rural areas need tools for economic development, land use and environmental planning, and the time available to achieve this goal is running out. The solution to this problem can be using newly introduced software to get the work done quickly.

1.1. Project Planning :

Project planning is the most challenging phase of the project life cycle, as it involves creating plans to manage time, cost, quality, changes, risk, and external suppliers. It involves making an educated guess about the staff, resources, and equipment needed to complete the project.

The purpose of the project planning phase is to:

- Establish business requirements
- Establish cost, schedule, list of deliverables, and delivery dates
- Establish resources plans
- Obtain management approval and proceed to the next phase.

1.2. Project Scheduling

Scheduling is essential for successful project management, determining the timing of activities, deliverables, and milestones. The purpose of Project scheduling is to:

- Assists with tracking, reporting, and communicating progress
- Ensures everyone is on the same page with tasks, dependencies, and deadlines
- Highlights issues and concerns, such as a lack of resources
- Identifies task relationships
- Monitors progress and identify issues early.

1.3. Project Tracking

Tracking is essential for construction projects to compare plan to actual progress, manage time and activities, and keep track of budget. It helps to analyze delays, schedule deviations, and identify necessary preventive measures.

1.4. Microsoft project

Microsoft Project is the most widely used tool for project scheduling and levelling finite resources. It helps the project manager avoid delays caused by resource allocation, and can automatically level resource calendar, tasks, dependencies, constraints, etc. Analyzing activities and their scheduling duration, material resource procurement sheet is prepared. Microsoft project is designed to assist a project manager in;

- Developing a plan
- Assigning resources to task,
- Tracking progress,
- Managing budget and
- Analyzing workloads

Benefits of Microsoft project

- It helps to plan, schedule, and track the projects.
- Over allocated resources can be levelled.
- Reports and graphics can be generated.
- Cost controlling and monitoring can be done.
- Project managers can easily analyse the risks and impacts in the projects.
- Comparison can be done between project plan and project performance.

1.5. Aim and Objectives :

The objectives of this study are:

- To identify construction sequence for a residential building construction.
- To work out the practical durations required to carry out the activities.
- To identify scheduling technique used by the organization on developing plan and scheduling.
- To track the project and analyses the reasons for delays, and increase in estimated budget etc.
- To investigate defects in the planning and scheduling procedure of the organization, and suggest suitable improvements in their method

2. BRIEF OVERVIEW OF LITERATURE

Sushant Pradhan (201) 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.

P. M. Wale, N. D. Jain, N. R. Godhani, S.R. Beniwal, and A.A. Mir: This research paper provides an overview of the use of Microsoft Project in project management for construction projects. Reference materials such as "Project Management Using Microsoft Project 2013: A Training and Reference Guide for Project Managers Using Standard, Professional, Server, Web Application and Project Online" can help civil engineers understand the software's functions. A case study conducted in Pune, India demonstrated the benefits of using Microsoft Project, resulting in a reduction in the total duration of the project and proper planning and execution. Civil engineers can benefit from training in Microsoft Project to achieve better results in project management.

Ankita V. Kamire, Priyanka S. Jawale, Vignesh Iyer (2022): The paper discusses the importance of project management in the construction industry, with a focus on resource scheduling using Microsoft Project software. It emphasizes the importance of effective project management in achieving project objectives and satisfying success criteria. It also discusses the three base calendars defined by Microsoft Project 2010, which can be used for a group of resources, a group of tasks, or the entire project. A case study of a residential building project was planned and scheduled using Microsoft Project software, which highlighted the importance of resource allocation in improving project accuracy, identifying overuse of resources, monitoring project development, and tracking costs.

Miss Dhanashri M. Panchbhute and Prof. Dr.P. P.Bhangale (2018): The main aim of any construction project is to complete it within a given time limit, with greater efficiency and economy. The authors have studied the planning and scheduling of projects using Microsoft Project software, which helps for optimum and effective organization of activities. Manpower planning, scheduling and tracking of construction projects by MSP, presented by Abhishek Sharma, P.M. Wale, often suffer from time and cost overruns due to improper planning, scheduling and completing works. Scheduling using Microsoft Project software gives good controlling and clear schedule to a project, which is very helpful for the successful completion of the project.

Nikhil R. Mahajan and M. V. Bhogone (2017): The methodology employed by the researchers involved a comparison between the use of Microsoft Project and the traditional method. They prepared schedules for both the conventional and prefabrication methods for a residential building. The results showed that the total duration for both the conventional and prefabrication methods, including prefab construction for individual houses and double-story buildings, required 13% more cost than conventional methods but reduced the project duration by 63 days.

Rhuta Joshi and Prof. V.Z. Patil (2015) :The authors analyzed the project management technique by scheduling various construction activities, allocation of resources and resource leveling using Microsoft Project 2013 for residential building. The study was carried out in two phases. In first phase data was collected from site and quantities were calculated as per drawing and required manpower was calculated. In second phase of construction activities was defined in MSP 2013. The result was as resource decreases duration increased by 10.38% and cost by 0.94%.

3.METHODOLOGY

3.1 Software Based Methodology:

The methodology of the project is divided into two phases:

Phase I: Planning and Scheduling

Phase II: Resource Allocation, Assign resources to Tasks, Resource Levelling

Phase I

A. Planning:

The First part is to prepare a process plan. In this process plan work breakdown structure is prepared, i.e. how your project will go, after one activity which is the next activity to be performed. And the scope of the project is defined.

1. Scope of work: With a definite project scope, managers can easily stay on track and ensure that all the deadlines are being followed throughout the project life cycle.
2. Data Gathering: Drawings are gathered as part of the data collection process. It is important to gather all architectural drawings, CAD drawings as well as a summary of all the actions involved.
3. Work breakdown structure: WBS is a deliverable oriented breakdown of a project into smaller component for completing complex, multistep project. The goal of a WBS is to make a large project more manageable. In WBS the list of the activities and their sequence is finalised.
4. Quantity Surveying: Calculating quantities from the obtained drawings for each and every item is a part of quantity surveying.

B. Scheduling:

Second step is to develop the schedule of the project.

Following is the scheduling process: Making a new project plan, assigning a calendar, setting project information, entering task, establishing WBS, scheduling activities, resource allocation and levelling in MS-Project are all steps in the process.

[1]	Create a new blank project
[2]	Add project Information
[3]	Add task name
[4]	Enter task duration
[5]	Create milestone
[6]	Linking task
[7]	Prepare resource sheet
[8]	Assign resources to task

Phase II

1.Resource Allocation:

The accuracy of a project's timetable can be improved by adding resources. The Microsoft Project software determines whether resources are over allocated or not when they are assigned, and if they are, it will indicate this in the task sheet and resource sheet. In the resource sheet we can add resources required for the project. There are 3 types of resources.

- a. Work resource: Includes manpower
- b. Material Resource: Includes materials, machinery
- c. Cost resource: Includes expenses

Task	Resource	Report	Project	View	Help	Resource Sheet Format	Tell me what you want to do				
Assign Resources	Resource Pool	Add Resources	Information	Notes	Details	Level Selection	Leveling Options				
Assignments	Insert	Properties	Level	Level Resource	Level All	Clear Leveling	Next Overallocation				
Resource Name	Type	Material	Initials	Group	Max.	Std. Rate	Ovt.	Cost/Uss	Accru	Base	Code
Architect	Work		A		100%	₹ 1,200.00/day	₹ 0.00/hr	₹ 0.00	Prorated	V calendar	
Site engineer	Work		S		100%	₹ 1,200.00/day	₹ 0.00/hr	₹ 0.00	Prorated	V calendar	
Supervisor	Work		S		100%	₹ 1,000.00/day	₹ 0.00/hr	₹ 0.00	Prorated	V calendar	
Mason	Work		M		100%	₹ 700.00/day	₹ 0.00/hr	₹ 0.00	Prorated	V calendar	
Helper	Work		H		100%	₹ 500.00/day	₹ 0.00/hr	₹ 0.00	Prorated	V calendar	
Carpenter	Work		C		100%	₹ 600.00/day	₹ 0.00/hr	₹ 0.00	Prorated	V calendar	
Plumber	Work		P		100%	₹ 600.00/day	₹ 0.00/hr	₹ 0.00	Prorated	V calendar	
Electrician	Work		E		100%	₹ 600.00/day	₹ 0.00/hr	₹ 0.00	Prorated	V calendar	
Painter	Work		P		100%	₹ 600.00/day	₹ 0.00/hr	₹ 0.00	Prorated	V calendar	
Cement	Material	bags	C			₹ 370.00		₹ 0.00	Prorated		
Bricks	Material	no.	B			₹ 7.00		₹ 0.00	Prorated		
Sand	Material	Cuft	S			₹ 180.00		₹ 0.00	Prorated		
Coarse aggregate	Material	Cuft	C			₹ 80.00		₹ 0.00	Prorated		
Steel	Material	kg	S			₹ 80.00		₹ 0.00	Prorated		
Tiles	Material	lumpsum	T			₹ 20,000.00		₹ 0.00	Prorated		
Paints	Material	lumpsum	P			₹ 20,000.00		₹ 0.00	Prorated		
Electric accessori	Material	lumpsum	E			₹ 15,000.00		₹ 0.00	Prorated		
Birla putti	Material	bags	B			₹ 850.00		₹ 0.00	Prorated		

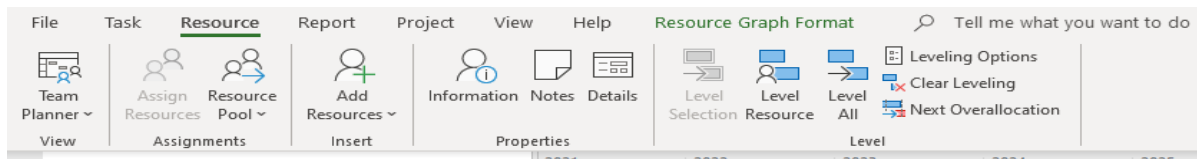
Screenshot No. 1. Resource Sheet Allocation

2. Assign Resources to task

In this we assign resources to tasks. Double click the task you will see summary task information where you can enter resources.

3. Resource Levelling:

Resource levelling helps managers get maximum use out of the resources available to them. The goal is to minimize waste and resolve conflicts like over-allocation, delays, budget overruns, or the need to add or remove tasks. You can perform it on individual projects or across multiple concurrent projects.



Screenshot No. 2 Resource Sheet

Task	Task Name	Duration	Baseline Cost	Cost	Remaining Cost	Actual Cost	Cost Variance	Baseline Start	Bas
1	Residential Building	239 days				₹ 1,390,115.00	₹ 162,760.00	Thu 17-11-22	Tue
2	Demolition	4 days				₹ 30,900.00	₹ 0.00	Thu 17-11-22	Mon
3	Apply for Permits	53 days				₹ 102,500.00	₹ 600.00	Thu 17-11-22	Wed
4	Document review & plan formation	8 days				₹ 1,500.00	₹ 900.00	Thu 17-11-22	Fri 2
5	Securing electrical permit	10 days				₹ 9,000.00	₹ 3,000.00	Sat 26-11-22	Wed
6	Secure sanctioning permit	45 days				₹ 92,000.00	₹ 1,500.00	Sat 26-11-22	Wed
7	Site cleaning	3 days				₹ 2,500.00	₹ 5,000.00	Sat 26-11-22	Tue
8	Layout	1 day				₹ 5,500.00	₹ 0.00	Thu 19-01-23	Thu
9	Sub structure	34 days				₹ 447,500.00	₹ 134,320.00	Fri 20-01-23	Thu
10	Excavation	4 days				₹ 14,800.00	₹ 5,000.00	Fri 20-01-23	Tue
11	Preparation of steel mesh	4 days				₹ 138,200.00	₹ 92,400.00	Fri 20-01-23	Tue
12	PCC	3 days				₹ 13,080.00	₹ 0.00	Wed 25-01-23	Sat
13	Column line out	1 day				₹ 2,000.00	₹ 0.00	Mon 30-01-23	Mon
14	Footing	3 days				₹ 16,900.00	₹ 4,400.00	Tue 31-01-23	Thu
15	Column	3 days				₹ 13,580.00	₹ 4,400.00	Fri 03-02-23	Mon
16	Ground beam	2 days				₹ 6,450.00	₹ 0.00	Tue 07-02-23	Wed
17	Brick work up to plinth level	3 days				₹ 55,750.00	₹ 25,800.00	Thu 09-02-23	Sat
18	Murum filling	2 days				₹ 17,500.00	₹ 2,500.00	Mon 13-02-23	Tue
19	Compaction	1 day				₹ 1,500.00	₹ 0.00	Wed 15-02-23	Wed
20	Plinth beam	2 days				₹ 55,950.00	₹ 8,800.00	Thu 16-02-23	Fri 1
21	Installation of septic tank and plumbing pipe	9 days				₹ 16,980.00	₹ 4,020.00	Mon 20-02-23	Wed
22	Bed concrete for plinth	1 day				₹ 100,710.00	₹ 0.00	Thu 02-03-23	Thu
23	Super structure	16 days				₹ 351,350.00	₹ 17,500.00	Fri 03-03-23	Thu
24	Column line out and column starter	1 day				₹ 2,300.00	₹ 0.00	Fri 03-03-23	Fri C
25	Column casting up to 7 feet	3 days				₹ 32,500.00	₹ 3,400.00	Sat 04-03-23	Fri C
26	Brick work up to 7 feet	8 days				₹ 140,000.00	₹ 7,300.00	Thu 09-03-23	Wed

Screenshot No. 3 Resource Levelling

3.2 On Site Methodology

Constructing a bungalow typically involves several steps, from planning to completion. Here is the procedure adopted on site till date:

1) Demolition:

We have adopted dismantling method. It is a manual operation which consist of destroying a building by knocking down its higher parts first. We required 4 days for the demolition work. It protects surrounding homes and buildings from being hit by falling stones and rubble.

2) Design and planning:

The most important details are the development of a design for a bungalow, creating architectural and structural drawings, obtaining necessary permits and approvals, finalizing the budget, signing a contract and giving notice to proceed. This takes 20 days and 65 days respectively..

3) Site preparation:

Once the design is finalized and permits are obtained, the construction site needs to be prepared. This may involve clearing the land, leveling the ground and installing temporary utilities such as water and electricity connections. It also involves constructing a temporary shade for labours and for storing material and equipment at site taking up 3 days.

4) Layout: Use the finalized layout to mark the site plan on the ground, using stakes, markers, or other methods. Ensure that the layout is accurately translated from the drawing to the site within a day, and confirm the location of key elements such as foundation corners, walls and utilities.

5) Foundation:

The next step is to construct the foundation of the bungalow, which serves as the base of the entire structure. Type of foundation is selected according to the soil conditions and structural requirements. In total 17 pits were dug and filled within 15 days. This was done in 3 batches due to limitation of space at the site. For 1st and 2nd batch 6 pits were dug and for 3rd batch 5 pits were dug after which marking of columns position, footing, and filling of columns till G.L is done. Next the pit filling is carried out.

Up next the pit for septic tank is dug up. PCC, brickwork if carried out followed by plastering and plumbing of the tank. Then the slab reinforcement is done followed by slab casting and plumbing work.

6) Structural Construction:

After the foundation is completed and inspected, the structural construction begins. This involves construction from ground beam to brickwork up to slab beam. Then the column for staircase are marked, pits are dug, their reinforcement and casting is done. They are now filled up to ground level. After which casting of columns till the 1st and 2nd flight is done.

7) Roofing:

Once the structural construction is complete, the roof is constructed using the specified roofing materials, such as steel sheets, tiles, or reinforced concrete slabs. Proper insulation and waterproofing measures are also incorporated.

8) Plumbing And Electrical Work:

Plumbing and Electrical Systems are installed according to the design, including water supply and drainage lines, electrical wiring, switches, and fixtures.

9) Flooring And Finishing:

The flooring and finishing work include, installing the flooring materials, such as tiles, marble, or wood, and applying finishes on walls, ceilings, and other surfaces. This may also include installing doors, windows, and other fixtures, and painting or plastering the walls.

10) Interior Work:

Interior work involves installing the kitchen cabinets, bathroom fixtures, and other interior features, as well as any additional carpentry work, such as wardrobes, shelves, and partitions.

11) Exterior Work:

Exterior work includes constructing the external walls, gates, driveways, landscaping, and other exterior features, as well as any required external finishes, such as painting or cladding.

12) Final Inspections And Handover:

Once the construction is complete, the bungalow is inspected by local authorities to ensure compliance with building codes and regulations. After obtaining the necessary clearances, the bungalow is handed over to the homeowner.

3.3.Problems Faced

- Weather Conditions
- Permitting and Regulatory Issues
- Design Changes or Discrepancies
- Material and Equipment Delays
- Labor Shortages or Workforce Issues
- Site Conditions
- Financial or Funding Issues
- Changes in Project Scope
- Stakeholder or Communication Issues
- Unforeseeable Events/ Force majeure events

3.4 Advantages & Disadvantages

Advantages:

1. **Efficient Planning:** MSP allows for efficient planning, scheduling, and tracking of tasks, which can help civil engineers meet deadlines and manage resources effectively.
2. **Resource Management:** It helps civil engineers to allocate resources properly, which can improve efficiency and reduce costs.
3. **Improved Collaboration:** MSP facilitates communication and collaboration among team members, making it easier for civil engineers to work together on projects and share information.
4. **Analysis of Critical Path:** The software can be used to identify the critical path in a project, helping civil engineers to prioritize tasks and allocate resources more effectively.
5. **Forecasting:** MSP allows civil engineers to create detailed project forecasts and evaluate potential risks, helping to minimize delays and avoid unexpected costs.

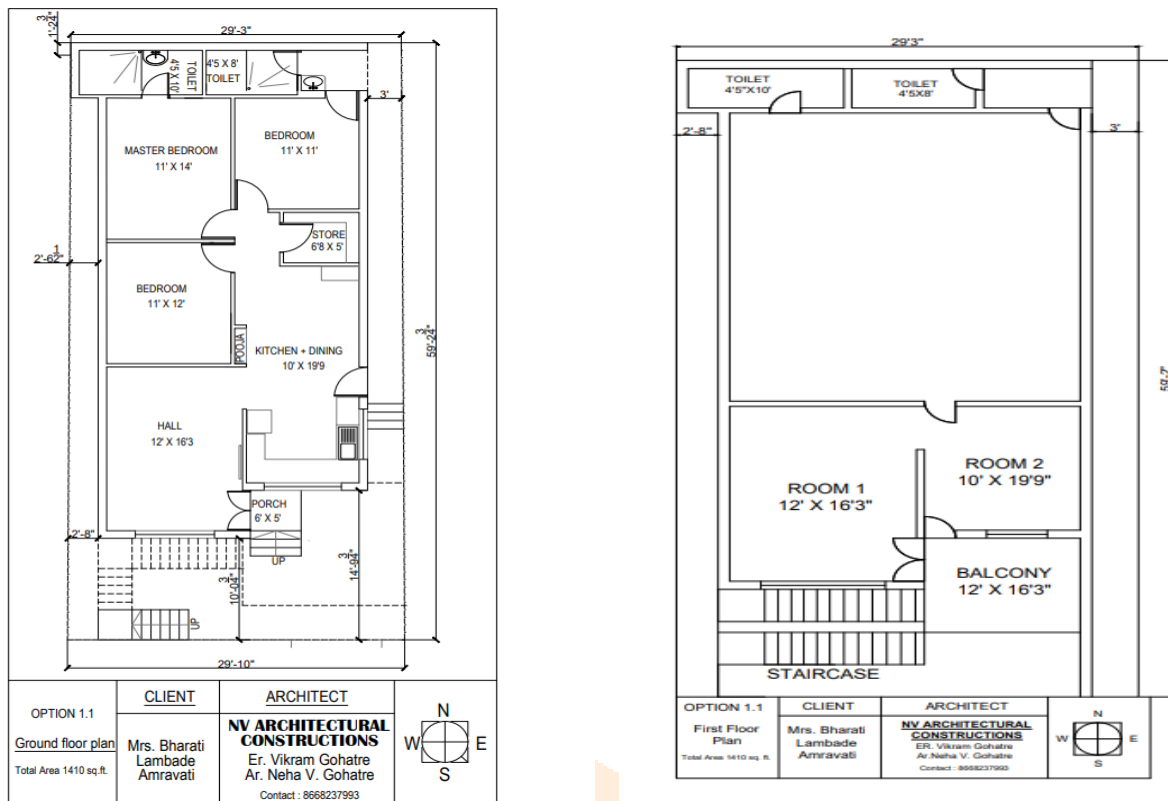
Disadvantages:

1. **Complexity:** MSP can be complex and difficult to learn for beginners, which can lead to errors or mistakes in the planning process.
2. **Cost:** MSP can be expensive, especially for small projects or companies, which can limit its accessibility.
3. **Dependence on Technology:** MSP requires a computer and software, which can be prone to technical issues and failures that can disrupt project management.
4. **Over-reliance on Software:** MSP can create an over-reliance on software and automation, which can limit the creativity and problem-solving skills of civil engineers.
5. **Time-Consuming:** MSP requires a significant amount of time and effort to set up and maintain, which can be a disadvantage for smaller projects or companies with limited resources.

4.CASE STUDY :

The case study for the project involves the planning and scheduling of a residential building. For this case G+1 residential building, located at Kamal colony Amravati which is **Mrs. Bharati Lambade** residential building at Amravati Maharashtra, India was selected. The site details, plans and drawings etc were utilized to achieve the goals of the project. Type of Structure -Reinforced Cement Concrete Structure (RCC) G+1 Residential Building.

4.1. Study of plan



Ground Floor Plan

First Floor Plan

4.2 Calendar

A working calendar is defined in which the working days in a week and the working hours are specified. In this study, the name given to the project calendar and the timings are also given with a lunch break of one hour. The calendar is 6 hours working per day, and 1 hour for lunch break, 6 working days (36 hours) in a week and 26 working days in a month. Exceptional holidays are given. Working Time is from 10 AM to 5 PM.

4.3 Analysis of software

4.3.1 Create a New Project

The first step in using Microsoft Project to manage the project you are working on is to create a new project file and set up some of the operational parameters.

4.3.2 Create calendar:

Project calendar is used to assign tasks and resources to specific days, allowing organizations to track the progress of their projects.

4.3.3 Assign calendar to the selected project

We have to assign calendar which has data like dates and holidays to the project so as to get required data such as dates and timeline.

4.3.4 Task Mode

1. Manually schedule mode

The Task mode gives the option whether a task is scheduled manually or automatically. Manual schedule mode. The manually scheduled task placed anywhere in the schedule. This new feature gives greater flexibility and control over planning and managing schedule.

2. Auto Schedule Mode

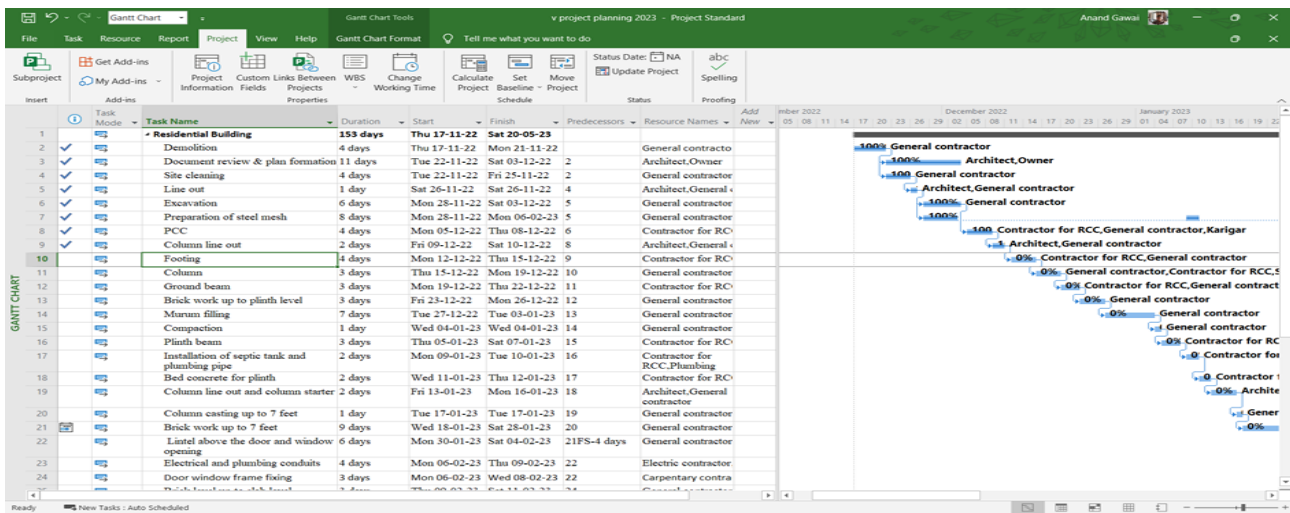
Automatic scheduling provides a highly planned, systematic means of managing the project schedule. Project calculates the earliest and latest dates for tasks for the optimal schedule.

4.3.5 Task Information

Task information such as duration, start date, finish date, predecessors, resources and notes can be viewed or provided to the task by double clicking on it.

4.3.6 Scheduling:

Gantt charts are a special type of view that are used extensively in project management. Gantt charts are used in project management, with the left side of the chart showing a sheet view and the right side showing a bar graph. In MSP, the Gantt chart is developed depending upon the duration we enter for respective task and how to efficiently establish task dependencies



Screenshot 4. Scheduling

4.3.7 Resource Allocation:

MSP calculates the resources demand curve, takes into account schedule, cost and effort, and automatically balances resources. Resources can help increase accuracy of a project by taking into account the project calendar, task dependencies and duration, and letting us know if there are any tasks that are under allocated. The most important details are that it can help track progress, record costs, and track major expenses. It can also assign resources to tasks, such as work resources, material resources, and cost resources. It also ensures proper resource allocation is followed and nothing is slipped through the cracks.

4.3.8 Tracking

Second important phase is tracking in project management. At start of actual work, main thing to highlight in project planning is communicating and developing the details of project plan. When actual work has been started, the next phase of project management is tracking progress.

4.4 PERT Analysis:

PERT chart (Program Evaluation Review Technique chart) display the relationships between tasks and show which tasks are critical to the project's completion. The PERT chart helps project managers to analyse the timeline of a project, identify the critical path, and estimate the time required to complete each task.

Here are some of the reasons why PERT analysis is important for construction projects:

- 1. Identifying Critical Path:** PERT analysis helps to identify the critical path in a project, which is the sequence of activities that must be completed on time for the project to finish on schedule. This allows project managers to focus their attention on the most important tasks and allocate resources accordingly.
- 2. Time Management:** PERT analysis helps to determine the time required to complete each activity, the dependencies between the activities, and the overall project duration. This enables project managers to create a realistic project schedule and allocate resources effectively to meet deadlines.
- 3. Resource Allocation:** PERT analysis helps to identify the resources required for each activity and the critical resources that are in short supply. This allows project managers to allocate resources effectively and ensure that they are used efficiently.
- 4. Risk Management:** PERT analysis helps to identify potential risks in the project schedule, such as delays or bottlenecks, and develop contingency plans to mitigate these risks. This helps to reduce the likelihood of delays and cost overruns.
- 5. Progress Tracking:** PERT analysis provides a framework for tracking project progress against the project schedule. This allows project managers to identify any delays or issues early on and take corrective action to keep the project on track.

Sr. No.	Activity	Optimistic Time t_o	Most likely Time t_l	Pessimistic Time t_p	Duration t_e	Variance
1	Demolition	2	4	6	4	0.444444
2	Apply for Permits				0	0
3	Document review & plan formation	8	9	10	9	0.111111
4	Securing electrical permit	5	10	15	10	
5	Secure sanctioning permit	40	45	50	45	2.777778
6	Site cleaning	1	3	5	3	
7	Layout	1	1	1	1	0
8	Sub structure				0	0
9	Excavation	2	5	8	5	1
10	Preparation of steel mesh	2	4	6	4	
11	PCC	1	3	5	3	0.444444
12	Column line out	1	1	1	1	0
13	Footing	2	4	6	4	0.444444
14	Column	2	3	4	3	0.111111
15	Ground beam	1	2	3	2	0.111111
16	Brick work up to plinth level	2	3	4	3	0.111111
17	Murum filling	1	2	3	2	0.111111
18	Compaction	1	1	1	1	0
19	Plinth beam	1	2	3	2	0.111111
20	Installation of septic tank and plumbing pipe	6	9	12	9	1
21	Bed concrete for plinth	1	1	1	1	0
22	Super structure				0	0
23	Column line out and column starter	1	1	1	1	0
24	Column casting up to 7 feet	2	3	4	3	0.111111
25	Brick work up to 7 feet	4	6	8	6	0.444444
26	Lintel above the door and window opening	1	2	3	2	
27	Door window frame fixing	2	3	4	3	0.111111
28	Brick level up to slab level	1	3	5	3	0.444444
29	Ground floor slab				0	0
30	Centring and shuttering	2	4	6	4	0.444444
31	Reinforcement	2	3	4	3	0.111111
32	Staircase casting	1	3	5	3	0.444444
33	Slab casting	1	1	1	1	0
34	Curing	28	28	28	28	0
35	1st floor				0	0
36	Column starter	1	1	1	1	0
37	Column casting up to 7 feet	2	3	4	3	0.111111
38	Brickwork up to 7 feet	2	4	6	4	0.444444
39	Lintel above the door and window opening	1	1	1	1	
40	Door window frame fixing	1	1	1	1	0
41	Brick level up to slab level	1	3	5	3	0.444444
42	1st floor slab				0	0
43	Centering and shuttering	1	3	5	3	0.444444

44	Reinforcement	1	2	3	2	0.111111
45	Slab casting	1	1	1	1	0
46	Curing	28	28	28	28	
47	Electrical and plumbing conduits	4	5	6	5	0.111111
48	External plastering	14	18	22	18	
49	Internal plastering	8	16	18	15	2.777778
50	Steel railing	2	3	4	3	
51	Flooring	8	12	16	12	1.777778
52	POP	3	4	5	4	0.111111
53	Wall putti	4	7	10	7	1
54	Sliding window fixing	3	6	9	6	
55	Door fixing	2	3	4	3	0.111111
56	Colour	20	24	28	24	1.777778
	Total	175	239	297	238	18.111111

4.5 Calculations:

Calculations of PERT Analysis:

- Standard deviation(X)= $\sqrt{\text{Sum of variance along critical path}} = 4.255$
- Expected days = 175 days
- Probability(Z)=(to-tp)/x=(175-239)/4.255 = -15.04
- Probability = 1.58 %
- Y= Probability of completion of project in 297 days
- Probability(Z)= (to-tp)/x = (161-103)/1.48 = 13.86
- Probability = 97.62 %
- Z=If probability is 90%, what is the project duration
- For 90% probability , Z = 1.29
- Z= (te-tp)/x, = (te-tp)/1.48= 1.29
- $t_e = 244.48 \approx 245$ days

5.RESULT & CONCLUSION

Sr. No.	DESCRIPTION	DAYS
1.	Baseline Duration	239
2.	Actual Duration	257
3.	Scheduling up to Ground Floor	122
4.	Tracking up to Ground Floor	138

5.1 CONCLUSION

MS Project is a simple to use software that has optimized the decision-making process and improved productivity. It was used to plan and schedule labor activities in a construction project. PERT analysis showed that the estimated time of completion was **239** days, but after resource levelling the duration was increased by **7%**. The baseline cost was Rs **2984840**, but the cost increased to Rs **3147600**. Resource scheduling reduced the unexpected loss of the project, and resource levelling was done for resource constrained analysis. The project was delayed by **18 days** due to changes in design, construction issues, budget constraints, insufficient space, and unexpected circumstances.

5.2 FUTURE SCOPE

MSP is an effective way to manage construction process from start to finish. It provides a framework to define the project scope, create a work breakdown structure, assign tasks to team members, and create a project schedule. The future scope of MSP is expected to evolve due to advances in technology and changing industrial need, leading to more efficient project management, cost reduction, and improved quality outcomes.

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