CONSTRUCTION MANAGEMENT AND SCHEDULING OF RESIDENTIAL BUILDING

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Abstract: Proper planning and scheduling are very important in construction projects for reducing and controlling delays of the project. Substantial amounts of time, money, resources are wasted each year in a construction industry due to improper planning and scheduling. With globalization the construction projects have become vast and complex. Planning of such projects requires huge amount of paperwork, which can be reduced with the help of project planning software. Providing good planning, proper organization, sufficient flow of resources to a project cannot automatically achieve desired result. A warning mechanism must be present which can alert the organization about its possible success and failures throughout the project. The main objectives of this study are to plan, schedule, and track a residential project with help of primavera software, study the results generated, it is possible to suggest which method is suitable for the selected residential project. Also, to recommend measures to the organization for enhancing their project planning skills for similar projects in future.

Keywords: Planning, Scheduling, Tracking, Project Planning Software, Primavera.

INTRODUCTION

Construction industry is an integral component of a nation's infrastructure and industrial growth. Construction industry is the second largest industry in India still its growth has been differential across the nation. There is a vast difference of development in the rural and urban areas. To cope up with the status of development in urban areas the rural regions need tools for economic development, land use and environment planning. Here arises the need for effective project management. Many problems and issues are being faced by the construction industry, major of them are cost overruns and time overruns due to inadequate project formulation, poor planning for implementation and improper management during execution. Many analysts state that average cost of project goes up by 30% as of the budgeted cost due to improper planning and scheduling. Observations show that proper skilful management is essential for a project to complete within time, estimated budget and with allocated resources. Providing good planning, proper organization, sufficient flow of resources to project can automatically achieve the desired result. A warning mechanism must be present which can alert the organization about its possible success and failures throughout the project.

Project Monitoring acts like a warning mechanism; it is the process of recording, collecting and reporting information regarding project performance that the project manager and others wish to know. Monitoring includes watching the progress of the project against time, performance schedule and resources during actual execution of the project and it identified the lagging areas which require timely attention and actions. It is very common to see project failing to achieve their missions within specified time and budget, the factors causing overrun as stated above inadequate project formulation, poor planning and lack of project management during execution, but the main cause of failure can be attributed to cost estimation failure and management failure. Large projects become more complex and the ability to exchange information on paper within organization on a timely basis gets difficult.

The traditional project management system cannot meet the demands of today's projects, as tremendous amount of information and data on a project are always changing. Project managers from construction industry state that their 70-80% time is spent on communication and 70% of project documentation is paper based. The main objectives of this study are to plan, schedule, and track a residential project with help of primavera software, study the results generated, it is possible to suggest which method is suitable for the selected residential project. Also, to recommend measures to the organization for enhancing their project planning for similar projects in future.

OBJECTIVE OF STUDY

The objectives of this study are:

1. To identify construction sequence for a residential building construction.
2. To work out the practical durations required to carry out the activities.
3. To identify scheduling technique used by the organization in developing plan and scheduling.
4. To develop scheduling using Primavera project planner's software.
5. To track the project and analyse the reasons for delays, and increase in estimated budget etc.
6. To investigate defects in the planning and scheduling procedure of the organization, and suggest suitable improvements in their methods.

CONSTRUCTION PLANNING

Construction planning is a fundamental and challenging activity in management and execution of construction projects. It includes the selection of technology, the definition of work task, the estimation of required durations and resources of individual task, and identify the interactions between different work tasks. A good construction plan is the base for developing the schedule and the budget for work. Developing the construction plan is a critical task in construction management, even if the plan is not written or else formally recorded. During planning a planner begins with a result (a design) and he must synthesize the steps required to yield this result. The necessary aspects of construction planning include the generation of required activities, analysis of the implications of these activities and the choice among various alternatives methods of performing these activities. A planner must imagine the final design and describe it in plans and specifications.

In developing a construction plan the importance is given either cost or schedule. Some projects a primarily divided into expense categories with associated cost in these cases planning is cost oriented. In this category, a distinction is made between cost incurred directly in the performance of the activity and indirectly for the accomplishment of the project. For other projects where time is a critical or the planner ensures that proper predeceasing among activities is maintained and that efficient scheduling of the available resource prevails. In such cases a critical path scheduling procedure is followed. Finally, most of the complex projects require considerations of both cost and schedule over time, so that planning; monitoring and record keeping must be considered in both dimensions. In these cases, integration of budget and scheduling information is a major concern.

SCHEDULING

Scheduling is determination the timing of events in the project that is when and which task will be performed? Putting it in simple words it is a reflection of plan. In other words, we can say, planning is How, What and Who whereas scheduling is when and why. Scheduling can be also defined as the detailed plan of the project work tasks with respect to time. A

schedule is also a good communication tool between all the stakeholders of the project. Schedule gives an overall sense of expected progress of the project without schedule it is very difficult to explain someone unfamiliar with the project what is going on and what is expected to take place.

TRACKING

Tracking is the process of collecting, entering and analysing of actual project performance values, such as work on tasks and actual durations. Tracking is the second major phase of project management. The main thing to focus on project planning is developing and communicating the details of project plan before actual work starts. When work begins, the next phase of project management is tracking progress. Tracking means recording project details such as what work did by whom, when the work was done, and at what costs these details are called as actual. Properly tracking actual work and comparing it's against original plan is useful to identify the difference in actual and planned and it enables to adjust incomplete task of the plan.

LITERATURE REVIEW

Subramani.T and Chinnadurai.K(2015) has discussed that long-introduced Industrialized Building System (IBS) has promised to solve and improve the current construction method and scenario in our country, but the IBS method has not gained enough popularity. One of the reasons is due to lack of research works done to quantifying the benefit of IBS especially in construction time saving. In lieu with such scenario, this study conducted to quantify evidence of time saving in IBS application. Primavera P6 is amazing software, which is used not just by planners, but also managers, engineers, schedulers, and anyone else involved in planning, management, reporting of a project.. Designed to make managing large or complex projects a piece of cake, Primavera is the ideal tool for anyone who is involved in planning, Monitoring and reporting on the progress of any big task, development or venture. Primavera allows for top level planning as well as being ideal for managing the intricate details. This enables project managers, planners, planning controllers and other associated professionals to have instant access to all the project information they require at the touch of a button. Also from this study shown not all IBS components can improved to the overall construction duration, however by adopting IBS components can improve and expedite the construction of 18 stories residential building from the point of departure of the project throughout of the whole of project's with a total 405 days or 42% the time saving.

Andrew Fernans Tom and Sachin Paul (2013) have proposed that project monitoring and control is the process of collecting, recording, and reporting information concerning project performance. Project controlling uses the data from monitor activity to bring actual performance to planned performance. The present study deals with the project monitoring process of "Standard Design Factory"; a four storied (G+3) factory building whose construction is in progress at Cochin, Kerala. A comparison between the planned progress of construction work and actual progress is performed in this study using project management software Primavera P6. Despite well- established principles and policies of project monitoring the process itself may not be efficiently accomplished in a project, because of those practical problems existing or arising in the project Such an attempt in realizing the practical problems in implementation of project monitoring and control will contribute to proper recognition of the problem areas and putting in place the control process to rectify the deviations.

SandipPawar and Attarde.P.M(2013) has described that planning and scheduling using tools and devices are helpful in comparing the project with stipulated cost, time and quality.

Sequencing model proposed to overcome the delay factor from the critical area, to minimize that delay of the construction and to reduce the time, cost and it also helpful to concentrate on the major areas in the project. It has hands-on experience in an ongoing project, and evaluation of schedule of equipment, staff, labour and material. It helps to plan and evaluate the resources for the construction of the building project. It also compares the cost variation due to the delay of the project and rescheduling the project by crashing process.

CONSTRUCTION MANAGEMENT

Construction industry is essentially a service industry. Construction activity involves converting the specified plan prepared by an engineer or by an architect in to a finished project. Successes in the construction industry depend largely on the ability of the management to plan and co-ordinate the numerous steps involved in the project execution.
Effective and efficient utilization of resources (materials, machinery, manpower, money and time) in an optimal manner is essential for the implementation of any project which is composed by many activities and tasks. Since every project is different, the problems faced are also different. In construction business even one problem may prove costly as the concerned personal may never have encountered it before.

CPM/ PERT

The modern network techniques are called by various names such as PERT (Program Evaluation and Review Technique), CPM (Critical Path Method) and bar charts. All the advanced new emerged network techniques are emerged from the two basic well known techniques PERT and CPM.
The aim of the project is to present the planning, scheduling, cost of a multi stored building (G+5) with the help of most accurate network methods CPM and PERT.
CPM is a technique used for the planning and controlling the most logical and economic sequence of operations for completing a project whereas PERT is a technique used for scheduling and controlling the projects, whose activities are subjected to considerable degree of uncertainty in the performance time.
In order to achieve the aim of the project we have collected plans and layout of a building from the construction site then calculated required estimates of various activities of the building, scheduled time, labour requirement of each activity specified with the help of schedule rates given. A network diagram is drawn in order to analyse the critical path. Considering factor like float, the project is schedule to a certain number of days.

RESOURCES AND NEED FOR MANAGEMENT:

The resources required for the construction industry are:

- Men for skilled and unskilled work, supervision and management. Technical and managerial personnel are efficient use of human resources and to achieve project completion within estimated time and budget.
- Materials depending on the nature of the work such as cement, bricks, aggregates, reinforcement, fittings and fixtures for water supply and sanitary works, consumable items like fuels, lubricants etc.
- Machines required for the type of work to be executed such as trucks earth moving equipment pumps and mortars vibrators pile drivers etc. together with spare parts to attend repair and maintenance facilities.
- Funds should be available for smooth completion of the project. Financial planning is essential for smooth cash flow and outflow to void delays in project activities funds form an important resource as all other resources are dependent on the availability of funds.

NEED FOR CONSTRUCTION MANAGEMENT:

- To estimate the required man power, materials, machinery and finance in carrying out different activities of the project.
- To select and procedure different materials required for the construction especially when there is a limitation on the available resources.
- To have proper co-ordination among the various agencies involved in completing the project.
- To derive maximum benefit in terms of construction output under conditions of varying degrees of uncertainty
- To anticipate the factors that may cause delays resulting in increased costs and to take suitable remedial measures by efficient management.
- To provide an efficient programming and to apply improved techniques in scheduling and organizing which also provides a means of checking the progress of work and controlling the quality of work.

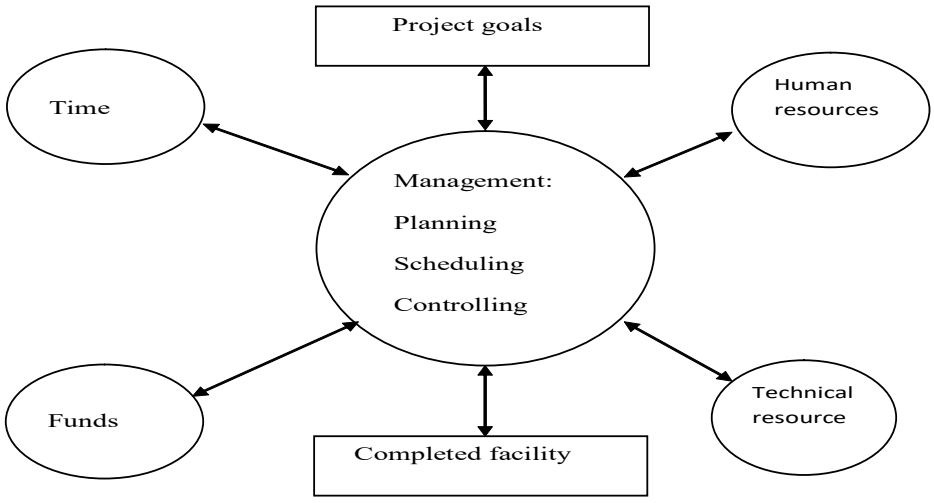
ADVANTAGES OF MANAGEMENT TECHNIQUES:

The following are the advantages through efficient management:

- Helps as a key for completing the given task.
- Accelerates the rate of construction and thus minimizes the duration of construction.
- Motivates people in the organization to the effective utilization of material resources i.e. machines, materials, methods and money for the achievement of organization goals.
- Helps to control the quality of materials and workmanship.
- Reduces cost of construction and makes any activity more economical.

ELEMENTS OF PROJECT MANAGEMENT:

Project management aims to achieve the stated goals of the project leading to completed facility, by virtue of planning, scheduling and controlling time, funds and human and technical resources.



FACTORS INVOLVED IN CONSTRUCTION MANAGEMENT:

- Planning, scheduling, organizing and controlling for arriving at optimum temperature.

- Selection of proper materials, their cost including lead charges, magnitude of man power and equipment.
- The appropriate time for using particular equipment during the construction.
- Availability of raw materials future demand and the probability of increase in cost.
- Procurement of materials and machinery.
- Probable time delays due to natural conditions like floods famine etc, or due to non-availability of men & material.
- Skills required in finishing the task as per specifications and quality.
- Co-ordination between different organizations involved in construction.

Thus, project management is a highly specialized job, to achieve the above objectives, which involves the following, three phases:

1. Project planning
2. Project scheduling
3. Project controlling.

The first two phases are accomplished before the actual project starts. The third phase is operative during the execution of the project.

PLANNING:

Planning in its broader sense is defined as the process of determination and formulation of the different steps and events in a particular task.

For the improvement of the flow of work, the first step to be taken is the planning of the work in various stages. Conditions necessary for the planning of a work are:

- Knowledge of the work to be done, its necessity, amount to be spent and the best way of doing it
- Knowledge of the capacity of the establishment available to do the work.
- Knowledge of the preferential order of doing work. The more completely standardized the work the easier it will be to ascertain the capacity of the persons engaged in the work.

IMPORTANCE OF PLANNING:

Planning requires imagination, foresight; sound judgment etc. planning also decides in advance what is to be done, how and where it is to be done to achieve the desired results. Planning is the basic function of management and is a must in any constructional or industrial or business activity.

The importance for proper planning may be summarized as below:

- Helps in anticipating future course of events and to make provisions for it.
- Prevents wastage of time, money and material.
- Ensures proper utilization of human and material resources to achieve the objectives in the given work.
- Helps the management to decide the kind of organization that would be needed to achieve the predetermined objectives.
- Gives direction and attention on objectives.
- Helps to offset change and uncertainty which eliminates the risk an looses caused by changing factors
- Lays down procedures, policies, objectives and operations to achieve economical operations.
- Helps to avoid bottlenecks in any constructional industry so as to carry out the works smoothly.

STEPS IN PROJECT PLANNING:

Following eight steps are generally recognized in the planning process of a project:

1. DEFINE: the objectives of the project in definite words.
2. ESTABLISH: goals and stages intermediate to attain the final target.
3. DEVELOP: forecast and means of achieving goals, i.e., activities.
4. EVALUATE: organization's resources- financial, managerial and operational- to carry out activities and to determine whether feasible or not.
5. DETERMINE: alternatives-individual courses of action that Will allow accomplishing goals.
6. TEST: for consistency with company's policy.
7. CHOOSE: an alternative which is not only consistent with its goals and concept but also one that can be accomplished with the evaluated resources.
8. DECIDE: on a plan. During the planning phase, the information needed is about all those operations or activities, which have to be carried out before the project is, completed their sequence and their logical inter relationship.

SCHEDULING:

Scheduling is the allocation of resources these resources in conceptual sense are time and energy, but in practical sense are time, space, equipment, and effort applied to material. More specifically, scheduling is the mechanical process of formalizing the planned functions assigning the starting and completion dates to each part of the work in such a manner that the whole work proceeds in a logical sequence and in an orderly and systematic manner. In other words scheduling is the laying out of the actual activities of the project in time order in which they are to be performed and calculating the manpower and material requirements needed to each stage of production along with the expected completion time of each of the activity.

Relationship Types	Symbols	Description
1. (FS) Finish to start		It indicates that the successor activity can begin only when the predecessor activity has completed.
2. (FF) Finish to finish		It indicates that the finish of the successor activity depends on the finish of the predecessor activity
3. (SS) Start to start		It indicates that the start of the successor activity depends on the start of the predecessor activity
4. (SF) Start to finish		It indicates that the successor activity cannot finish until the predecessor activity starts.

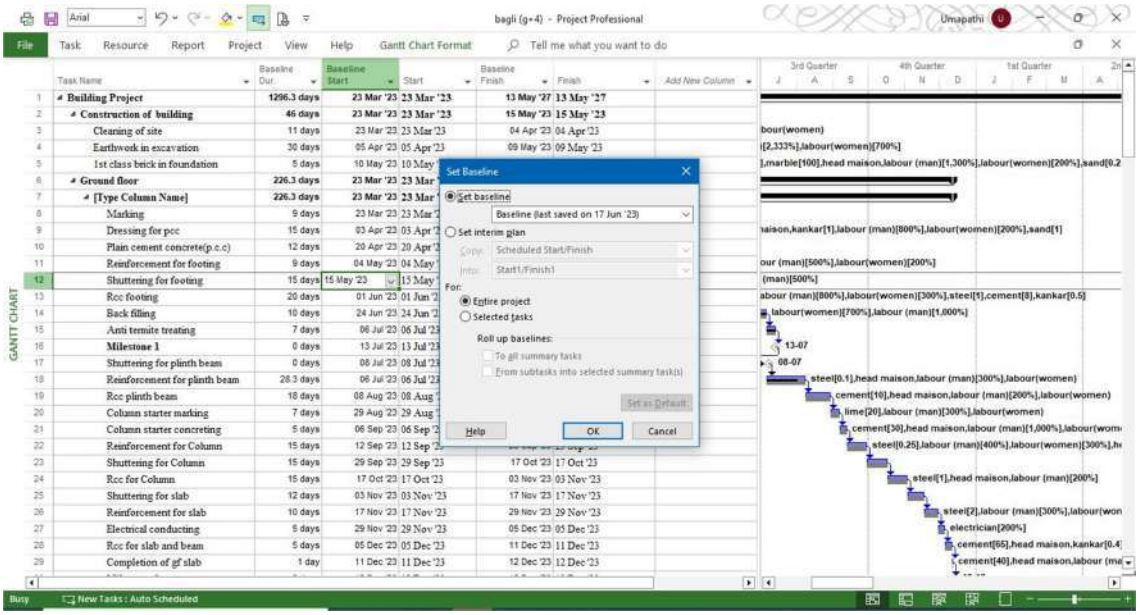
SCHEDULING

Your project schedule can be calculated one of two ways: when you choose the Scheduling command or, each time you make a change that affect schedule dates.
The Critical Path Method (CPM) scheduling technique is used to calculate project schedules. CPM uses activity durations and relationships between activities to calculate the project schedule.

METHODOLOGY

Baseline Schedule

A Baseline is a complete copy of a project plan that you can compare to the current schedule to evaluate progress. Before updating a schedule for the first time create a baseline. It provides a target against which one can track a project's cost, schedule and performance. Up to three baselines can be compared at once. Baseline projects do not exist as separate project to access.



Baseline Schedule

Task Name	Baseline Dur.	Baseline Start	Start	Baseline Finish	Finish
Building Project	**1296.3 days**	**23 Mar '23**	**23 Mar '23**	**13 May '27**	**13 May '27**
Construction of building	**46 days**	**23 Mar '23**	**23 Mar '23**	**15 May '23**	**15 May '23**
Cleaning of site	11 days	23 Mar '23	23 Mar '23	04 Apr '23	04 Apr '23
Earthwork in excavation	30 days	05 Apr '23	05 Apr '23	09 May '23	09 May '23
1st class brick in foundation	5 days	10 May '23	10 May '23	15 May '23	15 May '23
Ground floor	**226.3 days**	**23 Mar '23**	**23 Mar '23**	**12 Dec '23**	**12 Dec '23**
[Type Column Name]	**226.3 days**	**23 Mar '23**	**23 Mar '23**	**12 Dec '23**	**12 Dec '23**
Marking	9 days	23 Mar '23	23 Mar '23	01 Apr '23	01 Apr '23
Dressing for pcc	15 days	03 Apr '23	03 Apr '23	19 Apr '23	19 Apr '23
Plain cement concrete(p.c.c)	12 days	20 Apr '23	20 Apr '23	03 May '23	03 May '23
Reinforcement for footing	9 days	04 May '23	04 May '23	13 May '23	13 May '23
Shuttering for footing	15 days	15 May '23	15 May '23	31 May '23	31 May '23
Rcc footing	20 days	01 Jun '23	01 Jun '23	23 Jun '23	23 Jun '23
Back filling	10 days	24 Jun '23	24 Jun '23	05 Jul '23	05 Jul '23

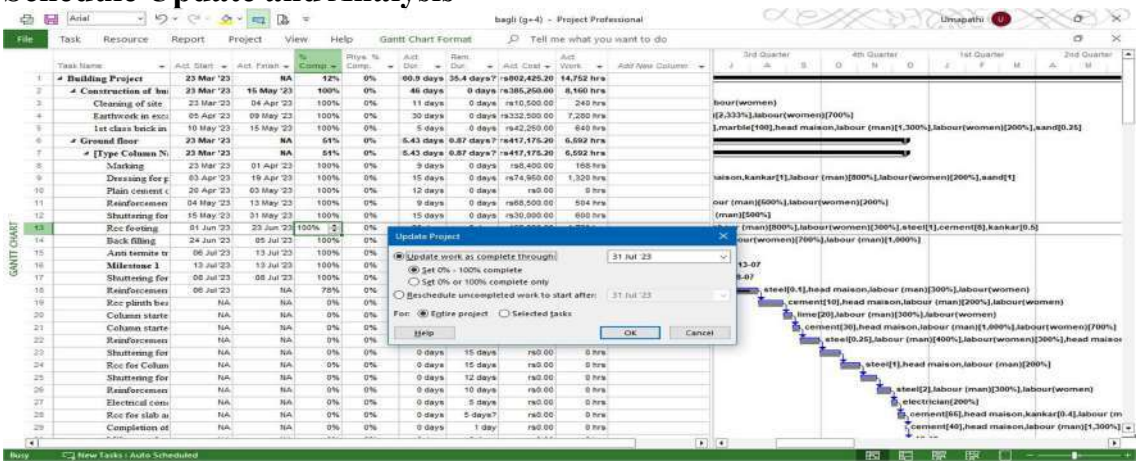
Anti termite treating	7 days	06 Jul '23	06 Jul '23	13 Jul '23	13 Jul '23
Milestone 1	0 days	13 Jul '23	13 Jul '23	13 Jul '23	13 Jul '23
Shuttering for plinth beam	0 days	08 Jul '23	08 Jul '23	08 Jul '23	08 Jul '23
Reinforcement for plinth beam	28.3 days	06 Jul '23	06 Jul '23	08 Aug '23	08 Aug '23
Rcc plinth beam	18 days	08 Aug '23	08 Aug '23	29 Aug '23	29 Aug '23
Column starter marking	7 days	29 Aug '23	29 Aug '23	06 Sep '23	06 Sep '23
Column starter concreting	5 days	06 Sep '23	06 Sep '23	12 Sep '23	12 Sep '23
Reinforcement for Column	15 days	12 Sep '23	12 Sep '23	29 Sep '23	29 Sep '23
Shuttering for Column	15 days	29 Sep '23	29 Sep '23	17 Oct '23	17 Oct '23
Rcc for Column	15 days	17 Oct '23	17 Oct '23	03 Nov '23	03 Nov '23
Shuttering for slab	12 days	03 Nov '23	03 Nov '23	17 Nov '23	17 Nov '23
Reinforcement for slab	10 days	17 Nov '23	17 Nov '23	29 Nov '23	29 Nov '23
Electrical conducting	5 days	29 Nov '23	29 Nov '23	05 Dec '23	05 Dec '23
Rcc for slab and beam	5 days	05 Dec '23	05 Dec '23	11 Dec '23	11 Dec '23
Completion of gf slab	1 day	11 Dec '23	11 Dec '23	12 Dec '23	12 Dec '23
Milestone 2	0 days	12 Dec '23	12 Dec '23	12 Dec '23	12 Dec '23
First floor	**110.5 days**	**12 Dec '23**	**12 Dec '23**	**18 Apr '24**	**18 Apr '24**
Stuctural work	1 day	12 Dec '23	12 Dec '23	13 Dec '23	13 Dec '23
Column starter marking	3 days	13 Dec '23	13 Dec '23	16 Dec '23	16 Dec '23
Column starter concreating	26 days	16 Dec '23	16 Dec '23	16 Jan '24	16 Jan '24
Reinforcement for Columns	9 days	22 Jan '24	22 Jan '24	01 Feb '24	01 Feb '24
Shuttering for Columns	10 days	01 Feb '24	01 Feb '24	13 Feb '24	13 Feb '24
Rcc for Columns	26.9 days	13 Feb '24	13 Feb '24	15 Mar '24	15 Mar '24
Reinforcement for slab	12 days	15 Mar '24	15 Mar '24	29 Mar '24	29 Mar '24
Shuttering for slab	12 days	29 Mar '24	29 Mar '24	12 Apr '24	12 Apr '24
Electrical conducting	3 days	12 Apr '24	12 Apr '24	16 Apr '24	16 Apr '24
Rcc for slab and beams	1.6 days	16 Apr '24	16 Apr '24	17 Apr '24	17 Apr '24
Completion of first floor slab	1 day	17 Apr '24	17 Apr '24	18 Apr '24	18 Apr '24
Finishing works for both the floors	**157 days**	**18 Apr '24**	**18 Apr '24**	**18 Oct '24**	**18 Oct '24**
Block work(100 mm thick)	25 days	18 Apr '24	18 Apr '24	17 May '24	17 May '24
Block work(50 mm thick)	20 days	17 May '24	17 May '24	10 Jun '24	10 Jun '24
Milestone 3	0 days	10 Jun '24	10 Jun '24	10 Jun '24	10 Jun '24
Door frame fixing	20 days	10 Jun '24	10 Jun '24	03 Jul '24	03 Jul '24
Electrical conducting	16 days	03 Jul '24	03 Jul '24	22 Jul '24	22 Jul '24
Plastering -celling	11 days	22 Jul '24	22 Jul '24	03 Aug '24	03 Aug '24
Plastering - internal walls	5 days	03 Aug '24	03 Aug '24	09 Aug '24	09 Aug '24
Flooring(rooms)	8 days	09 Aug '24	09 Aug '24	19 Aug '24	19 Aug '24
Flooring(toilets)	3 days	19 Aug '24	19 Aug '24	22 Aug '24	22 Aug '24
Flooring(corridor/lobby area)	6 days	22 Aug '24	22 Aug '24	29 Aug '24	29 Aug '24
Flooring(staircase)	4 days	29 Aug '24	29 Aug '24	03 Sep '24	03 Sep '24
Railing works(staircase)	7 days	03 Sep '24	03 Sep '24	11 Sep '24	11 Sep '24
Railing works(balcony)	1 day	11 Sep '24	11 Sep '24	12 Sep '24	12 Sep '24
Fixing of doors&window shutters	7 days	12 Sep '24	12 Sep '24	20 Sep '24	20 Sep '24
Interior painting	1 day	20 Sep '24	20 Sep '24	21 Sep '24	21 Sep '24
Electrical fixtures	9 days	21 Sep '24	21 Sep '24	02 Oct '24	02 Oct '24
Sanitary& water supply works	7 days	02 Oct '24	02 Oct '24	10 Oct '24	10 Oct '24
External plastering	1 day	10 Oct '24	10 Oct '24	11 Oct '24	11 Oct '24
Cladding work	5 days	11 Oct '24	11 Oct '24	17 Oct '24	17 Oct '24
External painting	1 day	17 Oct '24	17 Oct '24	18 Oct '24	18 Oct '24

Second floor	**110.5 days**	**18 Oct '24**	**18 Oct '24**	**25 Feb '25**	**25 Feb '25**
Stuctural work	1 day	18 Oct '24	18 Oct '24	19 Oct '24	19 Oct '24
Column starter marking	3 days	19 Oct '24	19 Oct '24	23 Oct '24	23 Oct '24
Column starter concreating	26 days	23 Oct '24	23 Oct '24	22 Nov '24	22 Nov '24
Reinforcement for Column	9 days	28 Nov '24	28 Nov '24	09 Dec '24	09 Dec '24
Shuttering for Columns	10 days	09 Dec '24	09 Dec '24	20 Dec '24	20 Dec '24
Rcc for Columns	26.9 days	20 Dec '24	20 Dec '24	21 Jan '25	21 Jan '25
Reinforcement for slab	12 days	21 Jan '25	21 Jan '25	04 Feb '25	04 Feb '25
Shuttering for slab	12 days	04 Feb '25	04 Feb '25	18 Feb '25	18 Feb '25
Electrical conducting	3 days	18 Feb '25	18 Feb '25	21 Feb '25	21 Feb '25
Rcc for slab and beams	1.6 days	21 Feb '25	21 Feb '25	24 Feb '25	24 Feb '25
Completion of first floor slab	1 day	24 Feb '25	24 Feb '25	25 Feb '25	25 Feb '25
Finishing works for both the floors	**157 days**	**25 Feb '25**	**25 Feb '25**	**27 Aug '25**	**27 Aug '25**
Block work(100 mm thick)	25 days	25 Feb '25	25 Feb '25	26 Mar '25	26 Mar '25
Block work(50 mm thick)	20 days	26 Mar '25	26 Mar '25	18 Apr '25	18 Apr '25
Milestone 4	0 days	18 Apr '25	18 Apr '25	18 Apr '25	18 Apr '25
Door frame fixing	20 days	18 Apr '25	18 Apr '25	12 May '25	12 May '25
Electrical conducting	16 days	12 May '25	12 May '25	30 May '25	30 May '25
Plastering -celling	11 days	30 May '25	30 May '25	12 Jun '25	12 Jun '25
Plastering - internal walls	5 days	12 Jun '25	12 Jun '25	18 Jun '25	18 Jun '25
Flooring(rooms)	8 days	18 Jun '25	18 Jun '25	27 Jun '25	27 Jun '25
Flooring(toilets)	3 days	27 Jun '25	27 Jun '25	01 Jul '25	01 Jul '25
Flooring(corridor/lobby area)	6 days	01 Jul '25	01 Jul '25	08 Jul '25	08 Jul '25
Flooring(staircase)	4 days	08 Jul '25	08 Jul '25	12 Jul '25	12 Jul '25
Railing works(staircase)	7 days	12 Jul '25	12 Jul '25	21 Jul '25	21 Jul '25
Railing works(balcony)	1 day	21 Jul '25	21 Jul '25	22 Jul '25	22 Jul '25
Fixing of doors&window shutters	7 days	22 Jul '25	22 Jul '25	30 Jul '25	30 Jul '25
Interior painting	1 day	30 Jul '25	30 Jul '25	31 Jul '25	31 Jul '25
Electrical fixtures	9 days	31 Jul '25	31 Jul '25	11 Aug '25	11 Aug '25
Sanitary& water supply works	7 days	11 Aug '25	11 Aug '25	19 Aug '25	19 Aug '25
External plastering	1 day	19 Aug '25	19 Aug '25	20 Aug '25	20 Aug '25
Cladding work	5 days	20 Aug '25	20 Aug '25	26 Aug '25	26 Aug '25
External painting	1 day	26 Aug '25	26 Aug '25	27 Aug '25	27 Aug '25
Third floor	**110.5 days**	**27 Aug '25**	**27 Aug '25**	**02 Jan '26**	**02 Jan '26**
Stuctural work	1 day	27 Aug '25	27 Aug '25	28 Aug '25	28 Aug '25
Column starter marking	3 days	28 Aug '25	28 Aug '25	01 Sep '25	01 Sep '25
Column starter concreating	26 days	01 Sep '25	01 Sep '25	01 Oct '25	01 Oct '25
Reinforcement for Columns	9 days	07 Oct '25	07 Oct '25	17 Oct '25	17 Oct '25
Shuttering for Columns	10 days	17 Oct '25	17 Oct '25	29 Oct '25	29 Oct '25
Rcc for Columns	26.9 days	29 Oct '25	29 Oct '25	29 Nov '25	29 Nov '25
Reinforcement for slab	12 days	29 Nov '25	29 Nov '25	13 Dec '25	13 Dec '25
Shuttering for slab	12 days	13 Dec '25	13 Dec '25	27 Dec '25	27 Dec '25
Electrical conducting	3 days	27 Dec '25	27 Dec '25	31 Dec '25	31 Dec '25
Rcc for slab and beams	1.6 days	31 Dec '25	31 Dec '25	01 Jan '26	01 Jan '26
Completion of first floor slab	1 day	01 Jan '26	01 Jan '26	02 Jan '26	02 Jan '26
Finishing works for both the floors	**157 days**	**02 Jan '26**	**02 Jan '26**	**04 Jul '26**	**04 Jul '26**
Block work(100 mm thick)	25 days	02 Jan '26	02 Jan '26	31 Jan '26	31 Jan '26
Block work(50 mm thick)	20 days	31 Jan '26	31 Jan '26	24 Feb '26	24 Feb '26

Milestone 5	0 days	24 Feb '26	24 Feb '26	24 Feb '26	24 Feb '26
Door frame fixing	20 days	24 Feb '26	24 Feb '26	19 Mar '26	19 Mar '26
Electrical conducting	16 days	19 Mar '26	19 Mar '26	07 Apr '26	07 Apr '26
Plastering -celling	11 days	07 Apr '26	07 Apr '26	20 Apr '26	20 Apr '26
Plastering - internal walls	5 days	20 Apr '26	20 Apr '26	25 Apr '26	25 Apr '26
Flooring(rooms)	8 days	25 Apr '26	25 Apr '26	05 May '26	05 May '26
Flooring(toilets)	3 days	05 May '26	05 May '26	08 May '26	08 May '26
Flooring(corridor/lobby area)	6 days	08 May '26	08 May '26	15 May '26	15 May '26
Flooring(staircase)	4 days	15 May '26	15 May '26	20 May '26	20 May '26
Railing works(staircase)	7 days	20 May '26	20 May '26	28 May '26	28 May '26
Railing works(balcony)	1 day	28 May '26	28 May '26	29 May '26	29 May '26
Fixing of doors&window shutters	7 days	29 May '26	29 May '26	06 Jun '26	06 Jun '26
Interior painting	1 day	06 Jun '26	06 Jun '26	08 Jun '26	08 Jun '26
Electrical fixtures	9 days	08 Jun '26	08 Jun '26	18 Jun '26	18 Jun '26
Sanitary& water supply works	7 days	18 Jun '26	18 Jun '26	26 Jun '26	26 Jun '26
External plastering	1 day	26 Jun '26	26 Jun '26	27 Jun '26	27 Jun '26
Cladding work	5 days	27 Jun '26	27 Jun '26	03 Jul '26	03 Jul '26
External painting	1 day	03 Jul '26	03 Jul '26	04 Jul '26	04 Jul '26
Fourth floor	**110 days**	**04 Jul '26**	**04 Jul '26**	**10 Nov '26**	**10 Nov '26**
Stuctural work	1 day	04 Jul '26	04 Jul '26	06 Jul '26	06 Jul '26
Column starter marking	3 days	06 Jul '26	06 Jul '26	09 Jul '26	09 Jul '26
Column starter concreating	26 days	09 Jul '26	09 Jul '26	08 Aug '26	08 Aug '26
Reinforcement for Columns	9 days	14 Aug '26	14 Aug '26	25 Aug '26	25 Aug '26
Shuttering for Column	10 days	25 Aug '26	25 Aug '26	05 Sep '26	05 Sep '26
Rcc for Column	26.9 days	05 Sep '26	05 Sep '26	07 Oct '26	07 Oct '26
Reinforcement for slab	12 days	07 Oct '26	07 Oct '26	21 Oct '26	21 Oct '26
Shuttering for slab	12 days	21 Oct '26	21 Oct '26	04 Nov '26	04 Nov '26
Electrical conducting	3 days	04 Nov '26	04 Nov '26	07 Nov '26	07 Nov '26
Rcc for slab and beams	1.6 days	07 Nov '26	07 Nov '26	10 Nov '26	10 Nov '26
Completion of first floor slab	1 day	10 Nov '26	10 Nov '26	11 Nov '26	11 Nov '26
Finishing works for both the floors	**157 days**	**11 Nov '26**	**11 Nov '26**	**13 May '27**	**13 May '27**
Block work(100 mm thick)	25 days	11 Nov '26	11 Nov '26	10 Dec '26	10 Dec '26
Block work(50 mm thick)	20 days	10 Dec '26	10 Dec '26	02 Jan '27	02 Jan '27
Milestone 6	0 days	02 Jan '27	02 Jan '27	02 Jan '27	02 Jan '27
Door frame fixing	20 days	02 Jan '27	02 Jan '27	26 Jan '27	26 Jan '27
Electrical conducting	16 days	26 Jan '27	26 Jan '27	13 Feb '27	13 Feb '27
Plastering -celling	11 days	13 Feb '27	13 Feb '27	26 Feb '27	26 Feb '27
Plastering - internal walls	5 days	26 Feb '27	26 Feb '27	04 Mar '27	04 Mar '27
Flooring(rooms)	8 days	04 Mar '27	04 Mar '27	13 Mar '27	13 Mar '27
Flooring(toilets)	3 days	13 Mar '27	13 Mar '27	17 Mar '27	17 Mar '27
Flooring(corridor/lobby area)	6 days	17 Mar '27	17 Mar '27	24 Mar '27	24 Mar '27
Flooring(staircase)	4 days	24 Mar '27	24 Mar '27	29 Mar '27	29 Mar '27
Railing works(staircase)	7 days	29 Mar '27	29 Mar '27	06 Apr '27	06 Apr '27
Railing works(balcony)	1 day	06 Apr '27	06 Apr '27	07 Apr '27	07 Apr '27
Fixing of doors&window shutters	7 days	07 Apr '27	07 Apr '27	15 Apr '27	15 Apr '27
Interior painting	1 day	15 Apr '27	15 Apr '27	16 Apr '27	16 Apr '27
Electrical fixtures	9 days	16 Apr '27	16 Apr '27	27 Apr '27	27 Apr '27
Sanitary& water supply works	7 days	27 Apr '27	27 Apr '27	05 May '27	05 May '27
External plastering	1 day	05 May '27	05 May '27	06 May '27	06 May '27

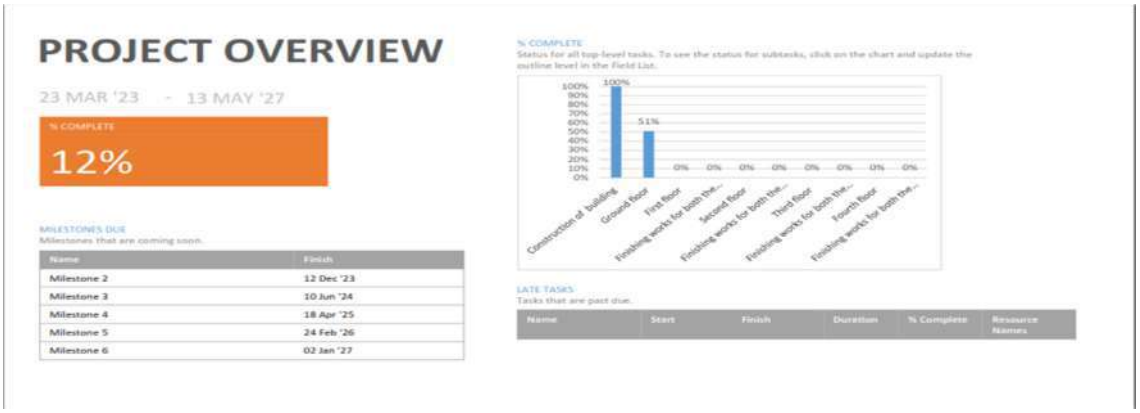
Cladding work	5 days	06 May '27	06 May '27	12 May '27	12 May '27
External painting	1 day	12 May '27	12 May '27	13 May '27	13 May '27

Schedule Update and Analysis

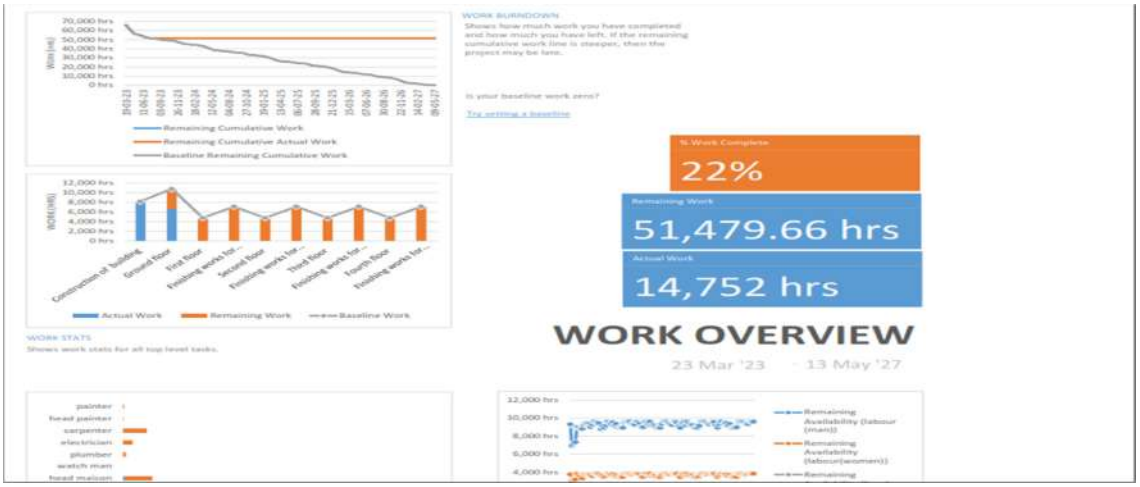


REPORTS

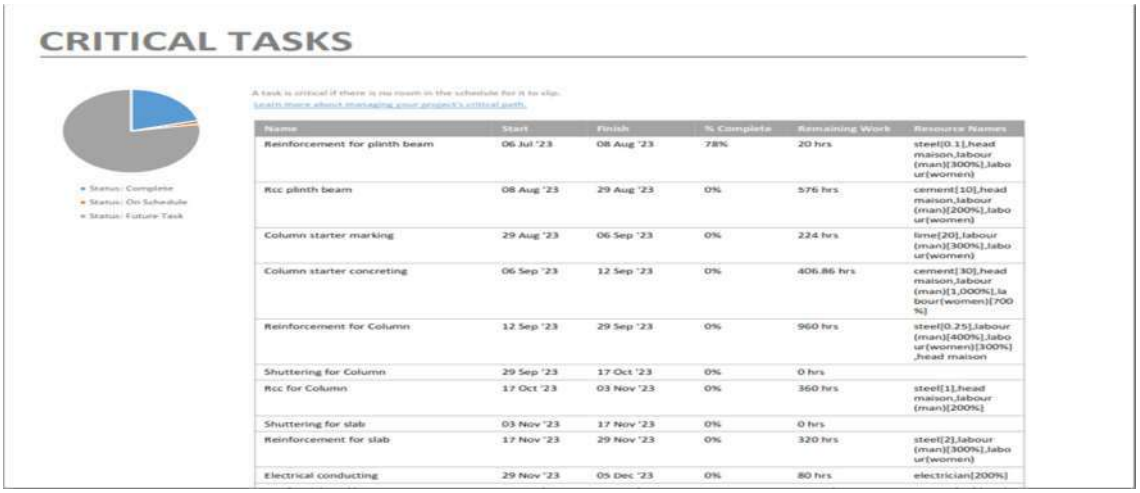
PROJECT OVERVIEW



WORK OVERVIEW



CRITICAL TASKS



Name	Start	Finish	% Complete	Remaining Work	Resource Names
Reinforcement for plinth beam	06 Jul '23	08 Aug '23	78%	20 hrs	steel[0.1],head maison,labour (man)[300%],labour(women)
Rcc plinth beam	08 Aug '23	29 Aug '23	0%	576 hrs	cement[10],head maison,labour (man)[200%],labour(women)
Column starter marking	29 Aug '23	06 Sep '23	0%	224 hrs	lime[20],labour (man)[300%],labour(women)
Column starter concreting	06 Sep '23	12 Sep '23	0%	406.86 hrs	cement[30],head maison,labour (man)[1,000%],labour(women)[700%]
Reinforcement for Column	12 Sep '23	29 Sep '23	0%	960 hrs	steel[0.25],labour (man)[400%],labour(women)[300%],head maison
Shuttering for Column	29 Sep '23	17 Oct '23	0%	0 hrs	
Rcc for Column	17 Oct '23	03 Nov '23	0%	360 hrs	steel[1],head maison,labour (man)[200%]
Shuttering for slab	03 Nov '23	17 Nov '23	0%	0 hrs	
Reinforcement for slab	17 Nov '23	29 Nov '23	0%	320 hrs	steel[2],labour (man)[300%],labour(women)
Electrical conducting	29 Nov '23	05 Dec '23	0%	80 hrs	electrician[200%]
Rcc for slab and beam	05 Dec '23	11 Dec '23	0%	1,080 hrs	cement[65],head maison,kankar[0.4],labour (man)[2,000%],labour(women)[600%],steel[0.5]
Completion of gf slab	11 Dec '23	12 Dec '23	0%	163.2 hrs	cement[40],head maison,labour (man)[1,300%],labour(women)[500%],sand[0.8],electrician[40%],plumber
Stuctural work	12 Dec '23	13 Dec '23	0%	0 hrs	
Column starter marking	13 Dec '23	16 Dec '23	0%	72 hrs	lime[5],labour (man)[225%],labour(women)[75%]
Column starter concreating	16 Dec '23	16 Jan '24	0%	2,304 hrs	cement[10],head maison,kankar[1.5],labour (man)[700%],labour(women)[400%]
Reinforcement for Columns	22 Jan '24	01 Feb '24	0%	72 hrs	cement[18],head maison,kankar[0.21],marble[24.3]
Shuttering for Columns	01 Feb '24	13 Feb '24	0%	80 hrs	cement[100],head maison
Rcc for Columns	13 Feb '24	15 Mar '24	0%	640 hrs	cement[89],head maison,kankar[0.18],labour (man)[500%],labour(women)[200%]
Reinforcement for slab	15 Mar '24	29 Mar '24	0%	782.4 hrs	steel[0.15],cement[50],marble[200],labour (man)[500%],labour(women)[300%],sand[0.26],head maison[15%]
Shuttering for slab	29 Mar '24	12 Apr '24	0%	480 hrs	labour (man)[300%],labour(women)[200%]
Electrical conducting	12 Apr '24	16 Apr '24	0%	48 hrs	electrician[200%]

	Rcc for slab and beams	16 Apr '24	17 Apr '24	0%	256 hrs	cement[45],labour (man)[1,500%],sand[0.2],head maison,labour(women)[400%]
	Completion of first floor slab	17 Apr '24	18 Apr '24	0%	0 hrs	
	Block work(100 mm thick)	18 Apr '24	17 May '24	0%	2,400 hrs	marble[50],head maison,labour (man)[700%],labour(women)[400%],kankar[0.2],sand[0.4]
	Block work(50 mm thick)	17 May '24	10 Jun '24	0%	1,920 hrs	marble[50],head maison,labour (man)[700%],labour(women)[400%],kankar[0.2],sand[0.4]
	Milestone 3	10 Jun '24	10 Jun '24	0%	0 hrs	
	Door frame fixing	10 Jun '24	03 Jul '24	0%	480 hrs	wood[100],carpenter[300%]
	Electrical conducting	03 Jul '24	22 Jul '24	0%	256 hrs	bulbs[6],electrician[200%],switch boards[25],tube lights[8],wires[100]
	Plastering -celling	22 Jul '24	03 Aug '24	0%	264 hrs	cement[5],sand[0.12],head maison[300%]
	Plastering - internal walls	03 Aug '24	09 Aug '24	0%	200 hrs	labour (man)[300%],cement[25],labour(women)[200%],sand[0.25]
	Flooring(rooms)	09 Aug '24	19 Aug '24	0%	128 hrs	labour (man)[200%],cement[20],marble[250],sand[0.14]
	Flooring(toilets)	19 Aug '24	22 Aug '24	0%	96 hrs	washing basin[2],marble[25],cement[15],labour (man)[300%],labour(women)
	Flooring(corridor/lobby area)	22 Aug '24	29 Aug '24	0%	144 hrs	marble[9],cement[5],labour (man)[200%],labour(women)
	Flooring(staircase)	29 Aug '24	03 Sep '24	0%	448 hrs	labour (man)[400%],carpenter[1,000%],cement[8]
	Railing works(staircase)	03 Sep '24	11 Sep '24	0%	224 hrs	railing[4],labour (man)[400%]
	Railing works(balcony)	11 Sep '24	12 Sep '24	0%	32 hrs	railing[4],labour (man)[400%]
	Fixing of doors&window shutters	12 Sep '24	20 Sep '24	0%	224 hrs	carpenter[400%],wood[45]
	Interior painting	20 Sep '24	21 Sep '24	0%	24 hrs	head painter,paint brushes[3],painter[200%],paint[50]
	Electrical fixtures	21 Sep '24	02 Oct '24	0%	72 hrs	electrician,wires[40],tube lights[4],switch boards[2],bulbs[4]
	Sanitary& water supply works	02 Oct '24	10 Oct '24	0%	112 hrs	showers[4],plumber[200%],foset[3],washing basin[4]
	External plastering	10 Oct '24	11 Oct '24	0%	32 hrs	sand[25],cement[0.02],labour (man)[400%]
	Cladding work	11 Oct '24	17 Oct '24	0%	0 hrs	
	External painting	17 Oct '24	18 Oct '24	0%	32 hrs	head painter,paint brushes[4],paint[25],painter[300%]
	Stuctural work	18 Oct '24	19 Oct '24	0%	0 hrs	
	Column starter marking	19 Oct '24	23 Oct '24	0%	72 hrs	lime[5],labour (man)[225%],labour(women)[75%]

	Column starter concreating	23 Oct '24	22 Nov '24	0%	2,304 hrs	cement[10],head maison,kankar[1.5],labour (man)[700%],labour(women)[400%]
	Reinforcement for Column	28 Nov '24	09 Dec '24	0%	72 hrs	cement[18],head maison,kankar[0.21],marble[24.3]
	Shuttering for Columns	09 Dec '24	20 Dec '24	0%	80 hrs	cement[100],head maison
	Rcc for Columns	20 Dec '24	21 Jan '25	0%	640 hrs	cement[89],head maison,kankar[0.18],labour (man)[500%],labour(women)[200%]
	Reinforcement for slab	21 Jan '25	04 Feb '25	0%	782.4 hrs	steel[0.15],cement[50],marble[200],labour (man)[500%],labour(women)[300%],sand[0.26],head maison[15%]
	Shuttering for slab	04 Feb '25	18 Feb '25	0%	480 hrs	labour (man)[300%],labour(women)[200%]
	Electrical conducting	18 Feb '25	21 Feb '25	0%	48 hrs	electrician[200%]
	Rcc for slab and beams	21 Feb '25	24 Feb '25	0%	256 hrs	cement[45],labour (man)[1,500%],sand[0.2],head maison,labour(women)[400%]
	Completion of first floor slab	24 Feb '25	25 Feb '25	0%	0 hrs	
	Block work(100 mm thick)	25 Feb '25	26 Mar '25	0%	2,400 hrs	marble[50],head maison,labour (man)[700%],labour(women)[400%],kankar[0.2],sand[0.4]
	Block work(50 mm thick)	26 Mar '25	18 Apr '25	0%	1,920 hrs	marble[50],head maison,labour (man)[700%],labour(women)[400%],kankar[0.2],sand[0.4]
	Milestone 4	18 Apr '25	18 Apr '25	0%	0 hrs	
	Door frame fixing	18 Apr '25	12 May '25	0%	480 hrs	wood[100],carpenter[300%]
	Electrical conducting	12 May '25	30 May '25	0%	256 hrs	bulbs[6],electrician[200%],switch boards[25],tube lights[8],wires[100]
	Plastering -celling	30 May '25	12 Jun '25	0%	264 hrs	cement[5],sand[0.12],head maison[300%]
	Plastering - internal walls	12 Jun '25	18 Jun '25	0%	200 hrs	labour (man)[300%],cement[25],labour(women)[200%],sand[0.25]
	Flooring(rooms)	18 Jun '25	27 Jun '25	0%	128 hrs	labour (man)[200%],cement[20],marble[250],sand[0.14]
	Flooring(toilets)	27 Jun '25	01 Jul '25	0%	96 hrs	washing basin[2],marble[25],cement[15],labour (man)[300%],labour(women)
	Flooring(corridor/lobby area)	01 Jul '25	08 Jul '25	0%	144 hrs	marble[9],cement[5],labour (man)[200%],labour(women)
	Flooring(staircase)	08 Jul '25	12 Jul '25	0%	448 hrs	labour (man)[400%],carpenter[1,000%],cement[8]
	Railing works(staircase)	12 Jul '25	21 Jul '25	0%	224 hrs	railing[4],labour (man)[400%]
	Railing works(balcony)	21 Jul '25	22 Jul '25	0%	32 hrs	railing[4],labour (man)[400%]
	Fixing of doors&window shutters	22 Jul '25	30 Jul '25	0%	224 hrs	carpenter[400%],

					wood[45]
Interior painting	30 Jul '25	31 Jul '25	0%	24 hrs	head painter,paint brushes[3],painter[200%],paint[50]
Electrical fixtures	31 Jul '25	11 Aug '25	0%	72 hrs	electrician,wires[40],tube lights[4],switch boards[2],bulbs[4]
Sanitary& water supply works	11 Aug '25	19 Aug '25	0%	112 hrs	showers[4],plumber[200%],foset[3],washing basin[4]
External plastering	19 Aug '25	20 Aug '25	0%	32 hrs	sand[25],cement[0.02],labour (man)[400%]
Cladding work	20 Aug '25	26 Aug '25	0%	0 hrs	
External painting	26 Aug '25	27 Aug '25	0%	32 hrs	head painter,paint brushes[4],paint[25],painter[300%]
Stuctural work	27 Aug '25	28 Aug '25	0%	0 hrs	
Column starter marking	28 Aug '25	01 Sep '25	0%	72 hrs	lime[5],labour (man)[225%],labour(women)[75%]
Column starter concreating	01 Sep '25	01 Oct '25	0%	2,304 hrs	cement[10],head maison,kankar[1.5],labour (man)[700%],labour(women)[400%]
Reinforcement for Columns	07 Oct '25	17 Oct '25	0%	72 hrs	cement[18],head maison,kankar[0.21],marble[24.3]
Shuttering for Columns	17 Oct '25	29 Oct '25	0%	80 hrs	cement[100],head maison
Rcc for Columns	29 Oct '25	29 Nov '25	0%	640 hrs	cement[89],head maison,kankar[0.18],labour (man)[500%],labour(women)[200%]
Reinforcement for slab	29 Nov '25	13 Dec '25	0%	782.4 hrs	steel[0.15],cement[50],marble[200],labour (man)[500%],labour(women)[300%],sand[0.26],head maison[15%]
Shuttering for slab	13 Dec '25	27 Dec '25	0%	480 hrs	labour (man)[300%],labour(women)[200%]
Electrical conducting	27 Dec '25	31 Dec '25	0%	48 hrs	electrician[200%]
Rcc for slab and beams	31 Dec '25	01 Jan '26	0%	256 hrs	cement[45],labour (man)[1,500%],sand[0.2],head maison,labour(women)[400%]
Completion of first floor slab	01 Jan '26	02 Jan '26	0%	0 hrs	
Block work(100 mm thick)	02 Jan '26	31 Jan '26	0%	2,400 hrs	marble[50],head maison,labour (man)[700%],labour(women)[400%],kankar[0.2],sand[0.4]
Block work(50 mm thick)	31 Jan '26	24 Feb '26	0%	1,920 hrs	marble[50],head maison,labour (man)[700%],labour(women)[400%],kankar[0.2],sand[0.4]
Milestone 5	24 Feb '26	24 Feb '26	0%	0 hrs	
Door frame fixing	24 Feb '26	19 Mar '26	0%	480 hrs	wood[100],carpenter[300%]
Electrical conducting	19 Mar '26	07 Apr '26	0%	256 hrs	bulbs[6],electrician[200%],switch boards[25],tube lights[8],wires[100]
Plastering -celling	07 Apr '26	20 Apr '26	0%	264 hrs	cement[5],sand[0.12],head maison[300%]
Plastering - internal walls	20 Apr '26	25 Apr '26	0%	200 hrs	labour (man)[300%],cement[36],labour(wo

					men)[200%],sand[0.25]
Flooring(rooms)	25 Apr '26	05 May '26	0%	128 hrs	labour (man)[200%],cement[20],marble[250],sand[0.14]
Flooring(toilets)	05 May '26	08 May '26	0%	96 hrs	washing basin[2],marble[25],cement[15],labour (man)[300%],labour(women)
Flooring(corridor/lobby area)	08 May '26	15 May '26	0%	144 hrs	marble[9],cement[5],labour (man)[200%],labour(women)
Flooring(staircase)	15 May '26	20 May '26	0%	448 hrs	labour (man)[400%],carpenter[1,000%],cement[8]
Railing works(staircase)	20 May '26	28 May '26	0%	224 hrs	railing[4],labour (man)[400%]
Railing works(balcony)	28 May '26	29 May '26	0%	32 hrs	railing[4],labour (man)[400%]
Fixing of doors&window shutters	29 May '26	06 Jun '26	0%	224 hrs	carpenter[400%],wood[45]
Interior painting	06 Jun '26	08 Jun '26	0%	24 hrs	head painter,paint brushes[3],painter[200%],paint[50]
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CONCLUSION

Based on the comparison between the manual scheduling and primavera scheduling, Primavera is efficient for scheduling the project and also to optimize the days by using Primavera. The critical path scheduling is done by using Microsoft Project.

Microsoft Project is efficient for the project because linking the project activities easily and also by using the four relationships can optimize the time of project. They should not have any modification in critical path.

The delay of the construction project is due to improper planning and scheduling. Thus, this project concludes that the delay can be rectified by proper scheduling and periodical tracking throughout the project.

The construction planning and scheduling was done using the project management software known as Primavera and was found effective in scheduling, allocation of resources and tracking of project. The schedule which was prepared here involves periodical as well as day to day observation in scheduling and tracking of the project. Scheduling using computer software as a tool was found to be easy and accurate. The project schedule and project track generation were its main highlight. The schedule report helps in identifying start date, finish date, also the duration of the project as a whole.

The construction planning and scheduling was done using the project management software known as Primavera and was found effective in scheduling, allocation of resources and tracking of project. The schedule which was prepared here involves periodical as well as day to day observation in scheduling and tracking of the project. Scheduling using computer software as a tool was found to be easy and accurate. The project schedule and project track

generation was its main highlight. The schedule report helps in identifying start date, finish date, also the duration of the project as a whole.

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