



Planning, scheduling and allocation of resources of Multistore building using Primavera software

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Abstract : Now a day's construction gets delayed in the site due to the factors such as inefficient management, design issues, economic variation, coordination failure between time schedule and execution etc. Poor scheduling of tasks is one of the main causes. Scheduling in construction project is the process of listing of tasks with a planned start and finish date. The scheduling is very important in construction projects and it cannot be neglected since it plays a crucial role in success of the project. Proper scheduling will ensure the completion of the project on time and within budget. It helps to outline the pace of the work and show how the tasks are executed. It also defines method and sequence in which materials are delivered. Overall, it permits adjustments to accommodate changes and unanticipated events. The big problem faced by the construction sector is not able to manage the fund allocated for the work and not able to complete the work in targeted days. This can be overcome by the implementation of effective scheduling in the construction field. Scheduling is a very important component of successful time management. Primavera is an enterprise project portfolio management software (EPPMS). It includes project management, scheduling, risk analysis, opportunity management, and resource management. This project report deals with scheduling of Boys Hostel building by using Primavera P6 software. Ongoing project is located at Rajkiya Engineering College, Mainpuri and manual scheduling data collected from the site. Project is under U.P. Rajkiya Nirman Nigam. Software uses CPM technique to schedule activities of the project. Cost required for the project execution is ultimately saved with proper scheduling process. For scheduling and creating WBS of the project, required steps are taken. We had created Gantt Chart view of the scheduling, allocated resources to activities and assigned roles to each resource and created calendar of the project based on the holidays in India.

In this project by using Primavera P6 software we had properly created WBS, schedule the activities and properly utilized resources and thus reduced the actual duration of the project and ultimately finish the project economically.

Keywords: Scheduling, Primavera, Optimization, Dynamic, WBS, Execution, CPM, Resource, Management, Variation, Estimate, Economic.

INTRODUCTION

Almost every industry worries about how to manage large complicated project effectively. Millions in cost overruns have been wasted due to the poor planning of the project. Unnecessary delays have occurred due to poor scheduling and companies have gone bankrupt due to poor controls. Here comes the role of project management. Primavera P6 is a very powerful tool for project management. This software helps in planning, scheduling, controlling, monitoring and cost optimization of projects very efficiently. In our college boys' hostel 3 construction is proposed. The usual method of construction management is understanding plan and execute the work. But execution of the work requires careful monitoring and controlling. Human sometimes make mistake in maintaining the progress of project but software facilitates to minimize these errors. Project managers easily manage, monitor, and keep track records of each activities using this software. There is various such software like MS Project, Oracle Primavera, etc. In our project we use Oracle's Primavera P6 Version 20 and schedule the construction steps of RECM Boys Hostel Building.

DETAILS OF THE PROJECT

Our project name is "Scheduling of Rajkiya Engineering College Mainpuri Boys Hostel building using Primavera P6". In this Project we have scheduled total 225 activities performed in the construction. Construction started from 1 October 2020. This project is under U. P. Rajkiya Nirman Nigam.

Table No. 1: Details of the Project

Sr. No	Information	Project details
1	Location of the building	REC Mainpuri, U.P. India
2	Type of the building	Framed structure
3	Duration of the project	24 Months
4	No. of storeys	G+2
5	Cost of project	897.85lakhs
6	Construction start date	01 Oct 2020
7	Type of soil	Sandy Loam

SCHEDULING

Scheduling is the process of determining the sequential order of the planned activities, assigning realistic durations to each activity and planning the start and finish dates of each activity. A time schedule outlines the project work sequence, it is like a time table of our work and tells us that when and what to perform further.

PRIMAVERA P6

Primavera P6 make our project management work easy. It is helpful in construction activity planning for creating logical sequence of activities, controlling the delay of the project and help in effective resource management. Primavera is used to complete the project within specified time and cost. It is the application of skills, tools and techniques to project activities in order to fulfil the deadline of the project.

Primavera software is used to scheduling, controlling, estimating the cost, and risk management in the project.

DELAY IN CONSTRUCTION WORKS

Today large number of projects in India are going late. As per data of Ministry of statistics and programme implementation Projects Costing Rs. 150 crore & above January-March, 2020 65% projects are delayed.

Primary causes of delays in construction projects are:

1. Change In Project Scope (what to perform?)
2. Project Complexity
3. Inadequate Planning
4. Inappropriate Project Schedule
5. Design Variation
6. Inefficient Material and Equipment Management
7. Inaccurate Engineering Estimate
8. Improper Post Execution Phase Management

LITERATURE REVIEW

S. Rajkumaar et al (2020): Concluded that after scheduling the G+3 building construction project using primavera they able to optimize the resources used in the project. It was observed that after planning and scheduling, the time duration of the building completion was reduced by nearly 1 month and Contract period was 11 months.

OBJECTIVE

The primary objectives of this project are:

1. Find the construction sequence for a RECM boys hostel building construction.
2. To calculate the practical durations required to carry out the activities.
3. To schedule the REC Mainpuri Boys Hostel Building construction project using Primavera P6.
4. To create Gantt chart view.

WORK METHODOLOGY

Steps involved in the scheduling of REC Mainpuri boys hostel building using Primavera P6 are:

1. Creating Project
2. Creating WBS
3. Creating Activities
4. Activity Detail Form
5. Creating Project Calendar
6. Creating Resources
7. Creating Roles
8. Role assigns to Resources

STEPS INVOLVED IN SCHEDULING

1. *Creating new project:*

In Primavera P6 software we have created our project with name "Scheduling of REC Mainpuri Boys Hostel" (Project Id- R-1) We have given anticipated project planned start

date and finish date. Global, resource or project calendar is assigned to this project.

2. Creating EPS:

To create an ideal schedule for any project first step is to Create the branches of enterprise under which project is made. So, we created the complete structure of the company with its branches, which is executing the project using primavera P6. This is called as Enterprise project structure (EPS).

3. Work breakdown structure

Work breakdown structure (WBS) is a process of breaking the project into easily identifiable major systems, their sub systems and discrete activities. WBS is a hierarchy of any project work that must be accomplished to complete a construction project.

Figure No.1: Flow chart view of our WBS

4. Defining activity

The smallest unit of a project that is the fundamental and key work elements of a project. The activity details include Activity like ID, activity name, start and finish dates, activity calendar, activity codes, activity type, constraints, expenses, predecessor and successor relationships, resources, roles etc.



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Figure No.2: Activity Detail form for excavation (general, status, resource, predecessors, successors tabs)

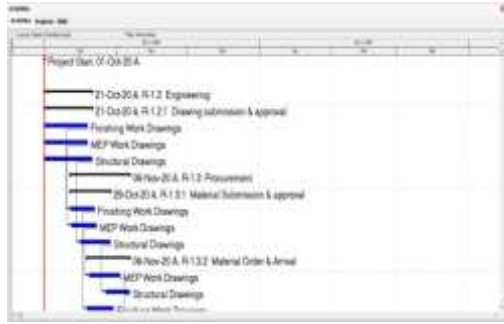


Figure No.3: Gantt chart view of activities

5. Relationship between activity

By assigning succeeding, preceding activities with significant relationship to the overall project activities, form a logical sequence of activities, after scheduling the activities will be connected to each other. Types of relationships are:

1. Finish to start (FS) relationship
2. Start to start (SS) relationship
3. Finish to finish (FF) relationship
4. Start to finish (SF) relationship

6. Creating a calendar

The calendar is created and assign to each activity before scheduling, it shows working and non-working days during project execution. These calendars define the available work hours in each calendar days. Also specify national holidays, organizations.

7. Creating baseline

A complete copy of the original schedule of the project is a simple baseline plan which provides a target against which a project's performance is tracked. Daily updates to be updated in Primavera P6. Tick mark finished if the activity has been finished and select the finish date. So, it is helpful in monitoring and controlling during execution of the project.

8. Relationships

Activities must relate to another activity in logical way. Relationship tells is which activity to be performed next?

Types of relationships:

1. Finish to Start
2. Start to Start
3. Finish to Finish
4. Start to Finish



Figure No.4: Relationships in the project

9. Roles

Roles are personnel job titles or skills. Roles are assigned to specific resources to identify the resource's skills. For example, plastering, concreting, plumbing, fitting work, carpentry, etc.

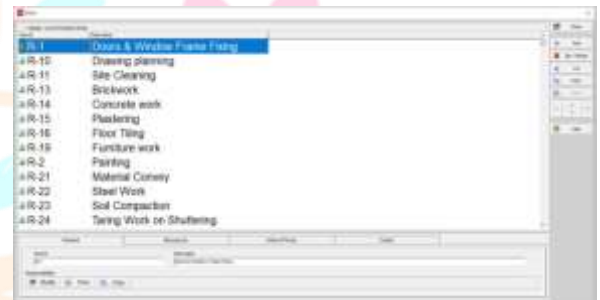


Figure No.5: Roles created in our Project

10. Resources

PG defines resources as anything used to complete a schedule activity; specifically, labour, non-labour, and material. Types of resources:

1. Labor- Man-power
2. Non-labor- Equipment, machines, tools etc.
3. Material- Cement, sand, steel, bricks etc.

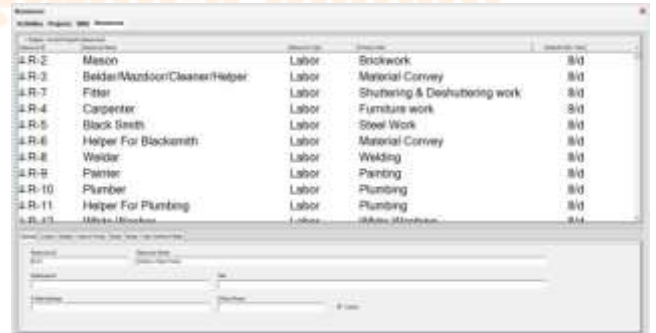


Figure No.6: Resources created in our Project

11. Role assigns to Resources

We have to assign role to the resources. For example, in plastering (role) assign to mason (resource).

12. Assign Resource to Activity

We have to assign resources to the activities. For example, in excavation (activity) resources are JCB Machine, its operator, and worker (resources).



Figure No.7: Assign resource to excavation

13. Scheduling

Scheduling helps to organize and complete projects in a timely, quality and financially responsible manner. The use of the critical path mathematical process allows scheduling to assign dates to activities, calculate project finish dates and reveal the critical path and activities of the project. After scheduling total duration of the project is 498 days as shown in figure below.

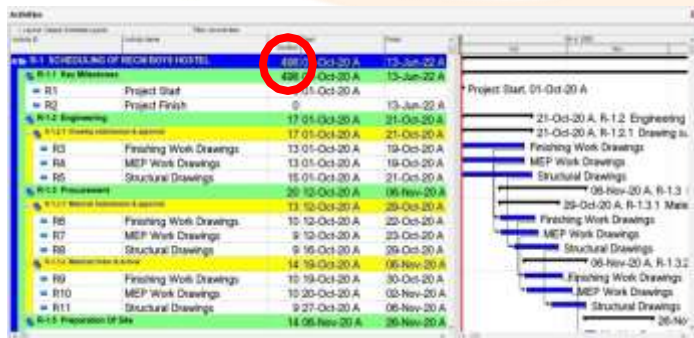


Figure No.8: Scheduling of the project

14. Gantt Chart View

A Gantt chart is a graphical depiction of our project schedule. It's a type of bar chart showing the start and finish dates of a project's elements such as resources, planning and dependencies (relationships).

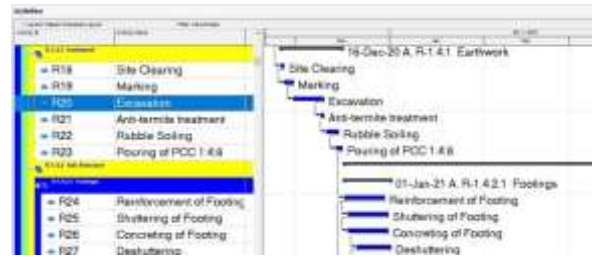
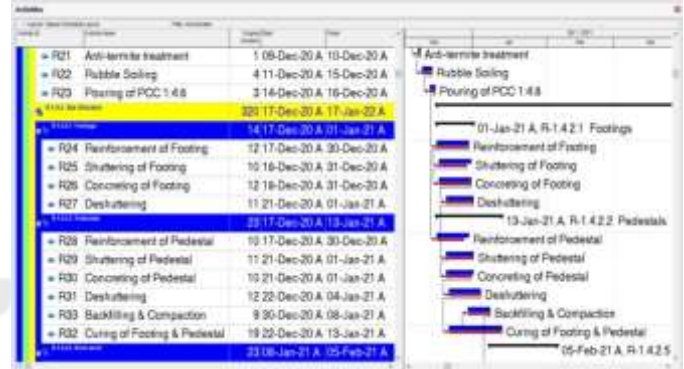
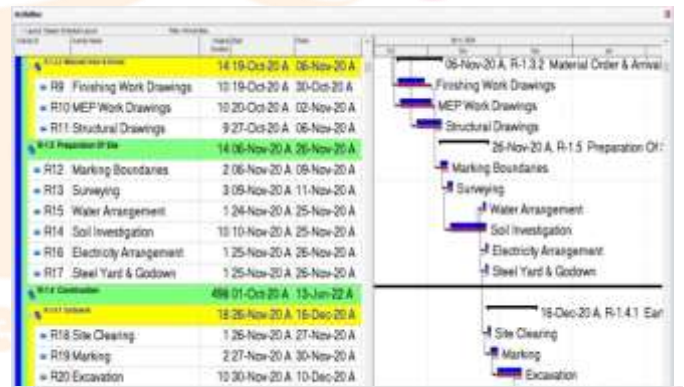
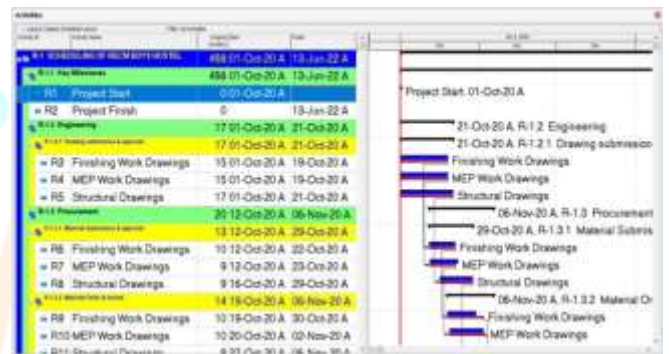
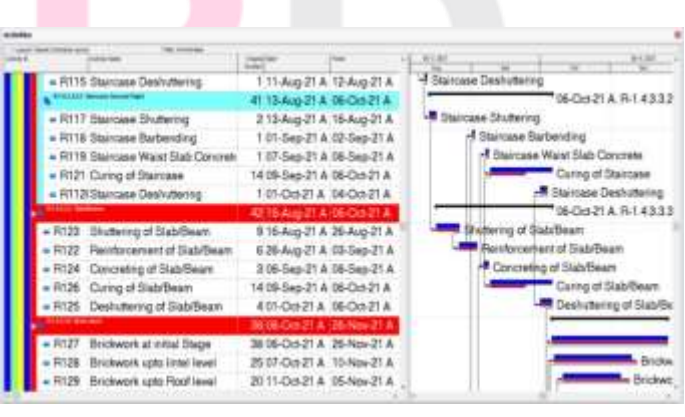
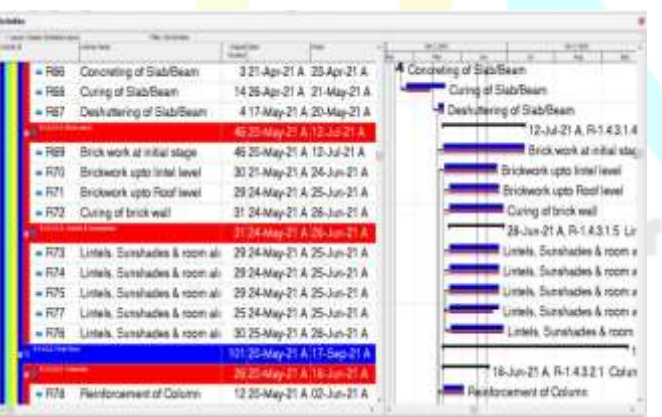
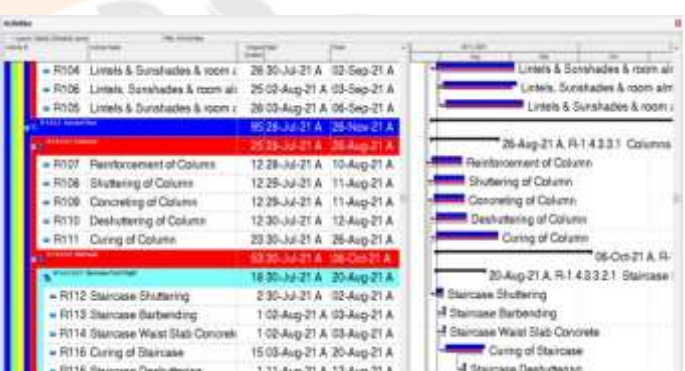
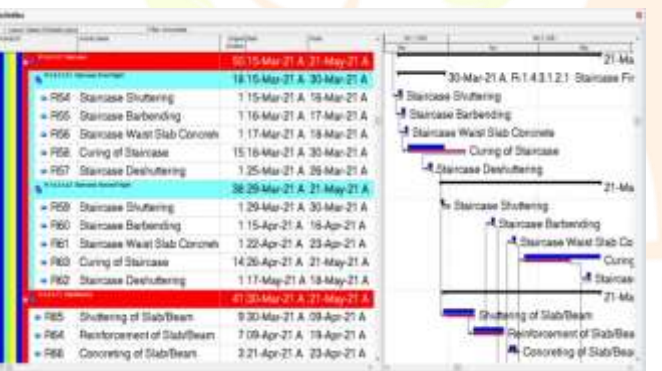
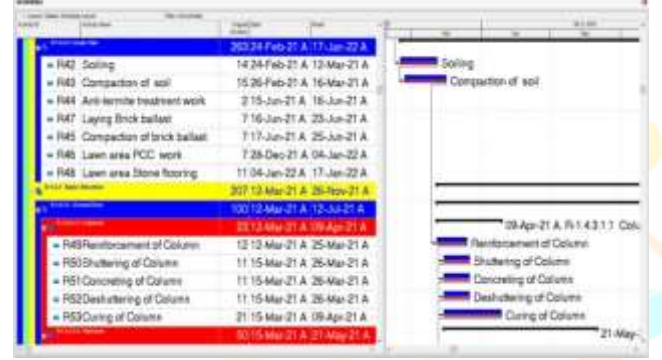
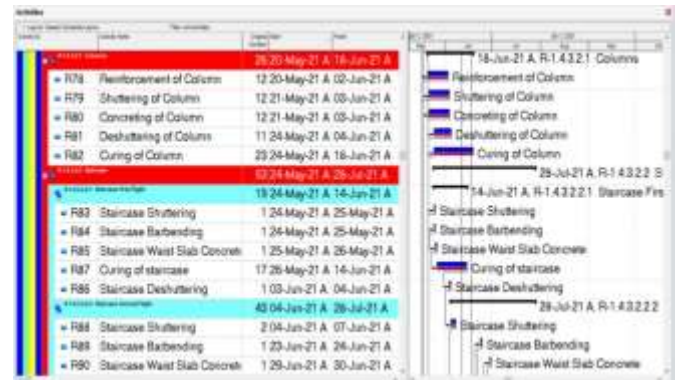
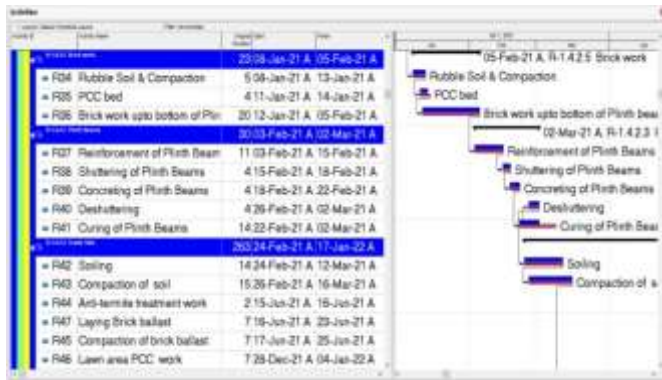
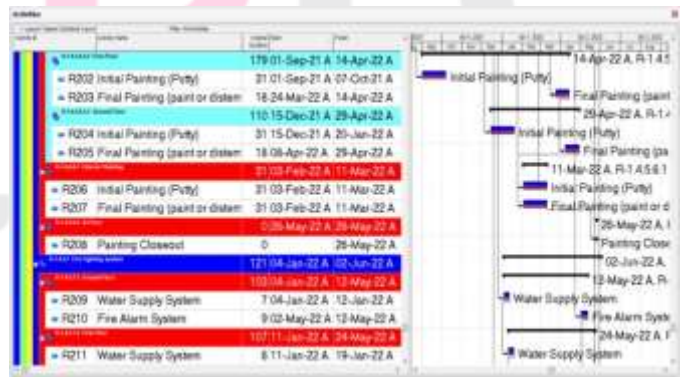
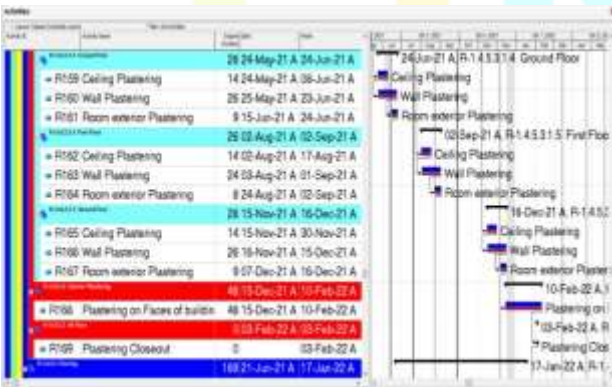
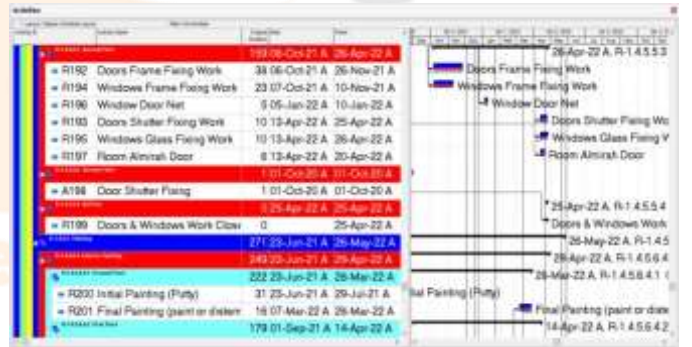
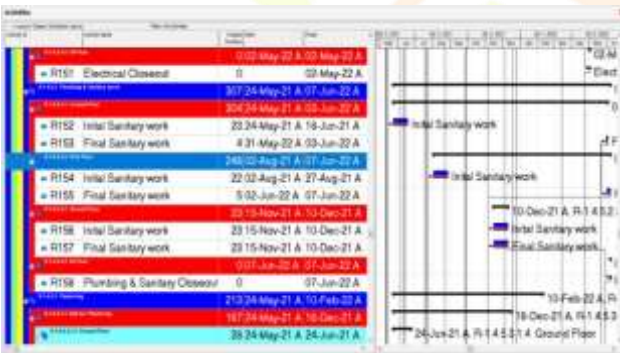
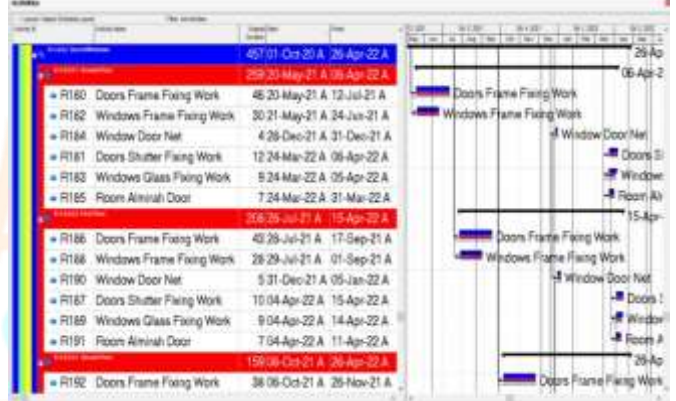
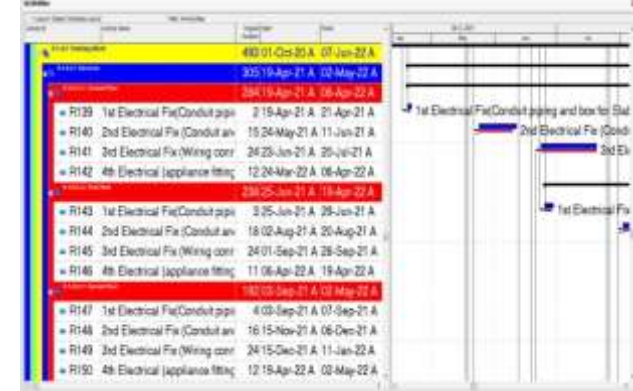
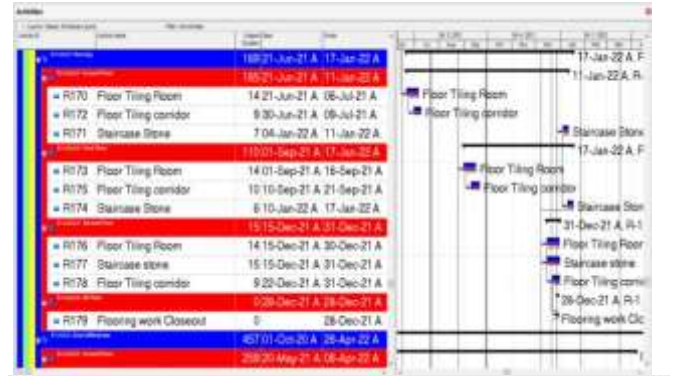
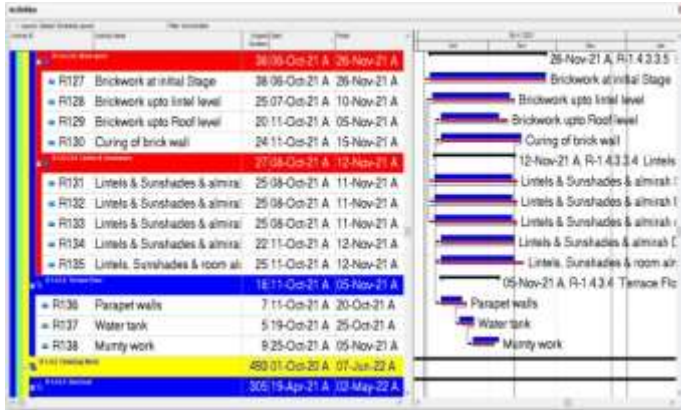


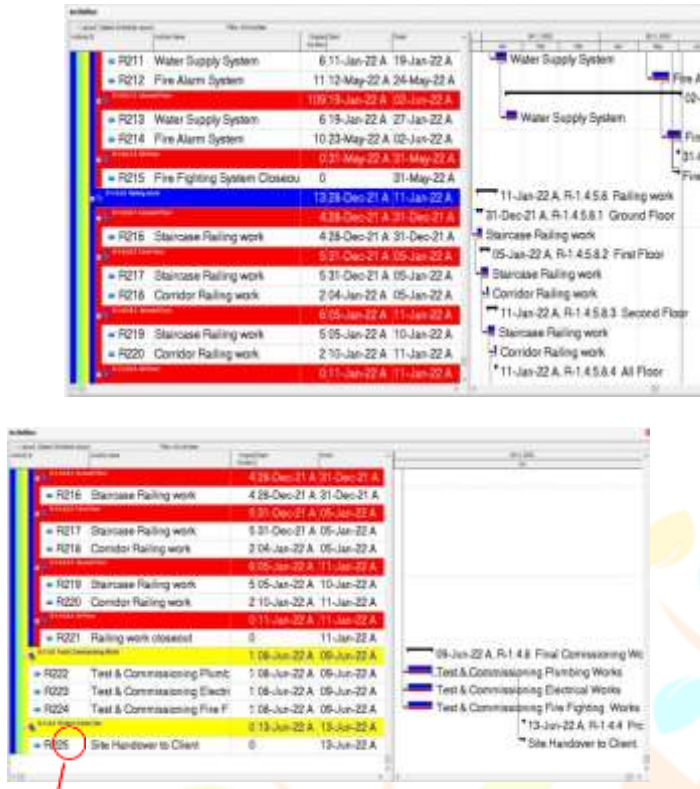
Figure No.9: Gantt Chart of the project
PRIMAVERA P6 PROJECT FINAL OUTPUT







Singh, Asst. Prof. Department of Civil Engineering, Rajkiya Engineering College, Mainpuri, we would also like to express our gratitude and sincere thanks to our teacher, Professor Baljeet Yadav, Asst. Prof. Head of the Department of Civil Engineering, Rajkiya Engineering College, Mainpuri, for his full support and assistance during the development of the project. We also do not like to miss the opportunity to acknowledge the contributions of all faculty members of the department for their kind assistance and cooperation during the development of our project. Finally, we acknowledge our team members for their sincere contribution to the completion of the project.



Hence, total 225 activities of the construction are scheduled.

OBSERVATION

It was observed that after planning and scheduling of REC Mainpuri Boys Hostel building using Primavera P6 the time duration was reduced by nearly 3.5 months. Hence after careful studying this software one can control the time duration of a project which ultimately save the cost.

RESULT

In our project "Scheduling of REC Mainpuri Boys Hostel Building Using Primavera P6" we finally save 3.5 months from estimated duration of the project. So, the final result is summarized below:

Table No. 2: Result of the Project

Estimated project duration	24 months
Project duration after using Primavera	20.5 months
Na. of months saved	3.5 months

CONCLUSION

Primavera P6 in a construction project helps us to understand the role of scheduling before execution of the project and monitoring and control of the progress of a construction project. This objective was achieved through careful planning, proper scheduling and effective resource utilization and project management skills. Results of this study highlights the present construction project delays. An efficient and proper planning is necessary to minimize unnecessary delays.

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