

# Resource Allocation, Scheduling and Planning of a Multi Storeyed Residential Building

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**Abstract.** For the purpose of minimising and managing project delays, effective planning and scheduling are essential elements of construction projects. Globalisation has led to an increase in the scale and complexity of construction projects. With the help of project management software, the quantity of paperwork and time required for such initiatives can be reduced. A warning system must be accessible throughout the project to alert the organisation to potential achievements and failures. Today's market offers a variety of computer software applications for project management, including MSP, Primavera P6, and others. Primavera has made it simple to assess the real progress of a construction project to the expected pace of the task. The project management tool Primavera P6 gathers, documents, monitors, regulates, and publishes data on project performance. Planning, allocating, and scheduling resources for a G+4 residential development are all part of this project. This study highlights the value of scheduling and interferes with the software by working on a construction project for a commercial building. This paper effectively demonstrates all the crucial steps, such as generating an EPS, developing a WBS, connecting tasks in accordance with their dependency and resource availability, and determining the Critical Path.

## 1 Introduction

The Project Administration module is a comprehensive, multi-project planning and oversight software based on the relational databases such as Oracle and Microsoft SQL Server for across the organisation project management scalability. To manage projects and resources, you can use the Project Management module on your own. Project management is the act of directing a team's work in order to achieve all of the project's objectives within the restrictions set. Details of this data are frequently included in the project's documentation prepared at the start of the development phase. The three most important are those concerning scope, time,

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and budget. Another challenge is how to distribute important inputs as efficiently as possible while using them to achieve present goals[1].

Your organisation may manage and store its projects centrally thanks to the project management module. The module is WBS (work breakdown structure) compliant. User-defined field codes, critical-path method (CPM) scheduling, resource levelling, and organisational breakdown structures (OBS) are a few examples of organisational breakdown structures. A construction project must be supervised by overseeing and coordinating every aspect of the venture from start to finish. It is a thorough procedure with the goal of completing projects on schedule and under budget[2].

Software for managing the project portfolio in large organisations is called Primavera. It allows for interaction, administration, managing projects, scheduling, risk assessment, possibility management, and handling of resources, as well as integration with other company applications such as Oracle and SAP's ERP systems. Primavera interfaces with various business software, including Oracle and SAP's ERP systems, and offers functions such as managing projects, scheduling, risk assessment, possibility management, management of resources, collaboration, and monitoring. Primavera was founded in 1983 thanks to Primavera Systems Inc., it was later bought by Oracle Corporation[3].

With the aid of the project management tool Primavera, you can plan, manage, monitor, and prioritise various projects, make the most of shared, scarce resources, keep changes under control, and move projects forward continually in the direction of timely and cost-effective completion. It provides solutions with scalable and adaptable interfaces, easy integration with project management systems like Microsoft Project and Primavera's Contract Manager Software, and customizable interfaces. Data sharing between Primavera and Microsoft Project is simple[4].

## 2 Review of Literature

Sumit Singh and Afzal Khan (2022) stated that utilisation of project management is determined by researchers. Yet none of them use software in building work assessed or compared the project to previous scheduled project of identical aspect. Authors decide how to utilise in resource allocation, project management software is used. The other - The more difficult - and more optimistic - task is to enhance the placement of essential inputs and use them to meet pre-defined goals. Rasikh Riyaz et al. (2022) survey found Both Primavera and Microsoft Project have been well-known project management systems that satisfy project objectives and organisational requirements. It's difficult to distinguish one tool against another because they employ different tactics and have diverse characteristics. Based on the project requirements, we should choose which software helps fulfil the specific project services in order to provide a high-quality CPM schedule [5]. Each tool has its unique set of capabilities, but they all aim to provide professional construction management services. The industrial project was monitored in both MS Project and Primavera P6, and both software programmes aided in the seamless tracking of construction activity. Primavera, on the other hand, lets several individuals to work on a project while also specifying the features that must be employed. It also makes it easier to create several activity interactions in which multiple types of relationships between the activities may be built[6]. Simranjeet Singh and Sakshi Bhatia (2022) primary goal was to understand more about the functions of planning, scheduling, resource allocation, and project progress control. The first and most crucial thing we can say is the start and end dates of the project may be obtained through proper Primavera planning. The resource allocation for each activity can be seen, and resources may be modified and reallocated at any time. Each activity's numerous resources, whether material, machinery, or labour, can be allotted. Owners of big enterprises and contractors currently monitor and coordinate many engineering and construction projects at the same time.

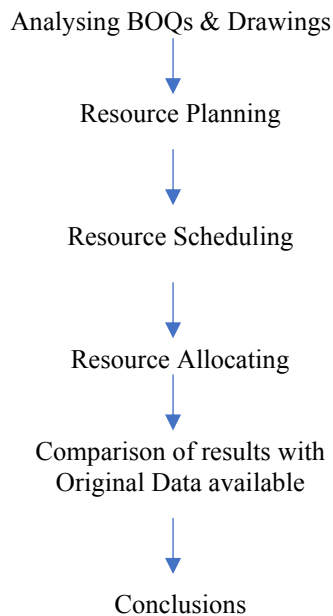
Insisting on project completion on schedule, while accounting for financial limits and maintaining a competitive market position, resulted in a rise in project management knowledge application. As a result, project managers must move away from a traditional organisational structure and toward a simple and efficient multi-project organisational structure (Armstrong,2005). P Jagtap et al. (2022)major purpose and mission were to learn and assess residential building planning and management with timely completion of any construction project [7]. This assists in projecting the overall duration of the task, which was supposed to be 749 days. The resources necessary to complete the project are known, as is the stage at which the specific resource will be required. This research served as an interpretive tool for the progress of Puranik's Hometown construction, allowing for the identification of numerous issues that arose during or before to the execution process. The current case study's output results define the utility of effective planning, scheduling, monitoring, and controlling [8]. Dionadya Pratisto and Hamonangan Girsang (2022) compared In accordance with Witt's 12 categories, Microsoft Project (MSP) & Primavera P6 (P6) show similarities in a variety of categories. When it applies to inputting, erasing, and updating data, MSP has the advantage of being simpler to use. Furthermore, MSP has an easy-to-use interface and visual representation, as well as integration using Microsoft Office where it may help MSP's task. While P6 includes an organisational structure as well as the ability to display diagrams that include OBS, EPS, WBS, and resources diagrams. P6 also offers benefits regarding the process of planning and revising progress on work and real units. P6 is also equipped with a security mechanism to prevent unwanted things out of critical project work. After planning is finished, import the WBS, tasks, ties, assets, and so on into Microsoft Project and Primavera P6 to account for any additional work that occurs throughout the project [9]. When the two-project management tools are compared, it is discovered as P6 is most appropriate for massive projects involving a big number of people, whilst MSP is better suited for individual projects and firms with fewer projects. While MSP is widely used for households, workplaces, small to medium-sized commercial structures, and other similar projects, P6 is more commonly utilized for petroleum and natural gas projects, power stations, mining, and well-known Indonesian projects, like the MRT project [10]. Nidhi Raghuvanshi1 and Prof. M. C. Paliwal (2021) research given to build scheduling and planning for the Pradhan Mantriawas Project using Primavera P6 V8.3 and to create a production sequence and comparative study of two blocks, in addition to to discover delays. Perform an economical risk analysis in Primavera P6. Economic risk assessment in Primavera P6 utilising a Gantt chart and allocating appropriate order and links between different jobs to ensure timely completion. The observation highlighted the issues that would eventually lead to the its delay and compared the timelines of each of the PMAY Urban blocks. Delay was reduced in this study by allocating resources based on task demand, availability of resources, and risks like the COVID 19 lockout. S. Rajkumaar et al. (2020) stated that primavera is an excellent tool for everyone involved in the planning, monitoring, and reporting on the progress of large and small projects. It also means that all parties may be kept up to date inside a single system, minimising duplicating data and keeping everyone informed. The study deals with the usage of managerial tools in the construction sector, especially Primavera. By following an exciting project, the many interpretations of activities and resource relationships utilising software were thoroughly described. Pankaj D. Varsani et al. (2020) concluded Any building venture may be effectively planned, scheduled, & tracked with the Primavera P6 software. Primavera P6 can be used to efficiently manage several projects. Primavera P6 supports scheduling for projects by allocating two connections to each task at the same time, considerably minimizing float. The P6 version of the Primavera application is very useful for smoothing resources and levelling tasks. The S-Curve depicts the movement of resources through time and enables us to handle them effectively. The Primavera software enhances project management. Gained value performance measures such

as the Schedule Performance Index (SPI) and Cost Performance Index (CPI) can help measure progress on projects more effectively. Anurag Mahure and Amitkumar Ranit (2018) study was to comprehend the role of control and monitoring in the development and timely finish of a building task, as well as the importance and usefulness of project management software like Primavera P6 in a building venture. This aim was achieved through updating the monitoring and control literature and processes. The research provided as a guidance to clarify the progress of construction work along with highlighting specific problems that developed during the process. The results of this research indicate the deficiencies of the present project management system with regard to project management and the significance of efficiency. Ajesh Pilaniya (2018) tried to appreciate the contrast among artificial & spring software in predicting financial and resource planning aspects of a project using, For instance, referencing and an exceptional tracking and oversight technique utilizing Primavera software. The planning of multiple operations during the project would make it perfect, allowing for effective management of cash and employees. The P6 version of the Primavera software package is an appropriate and effective option for managing projects, in addition to monitoring and regulating multiple building projects. [11]

### 3 Methodology

#### 3.1 Steps for launching a Primavera project

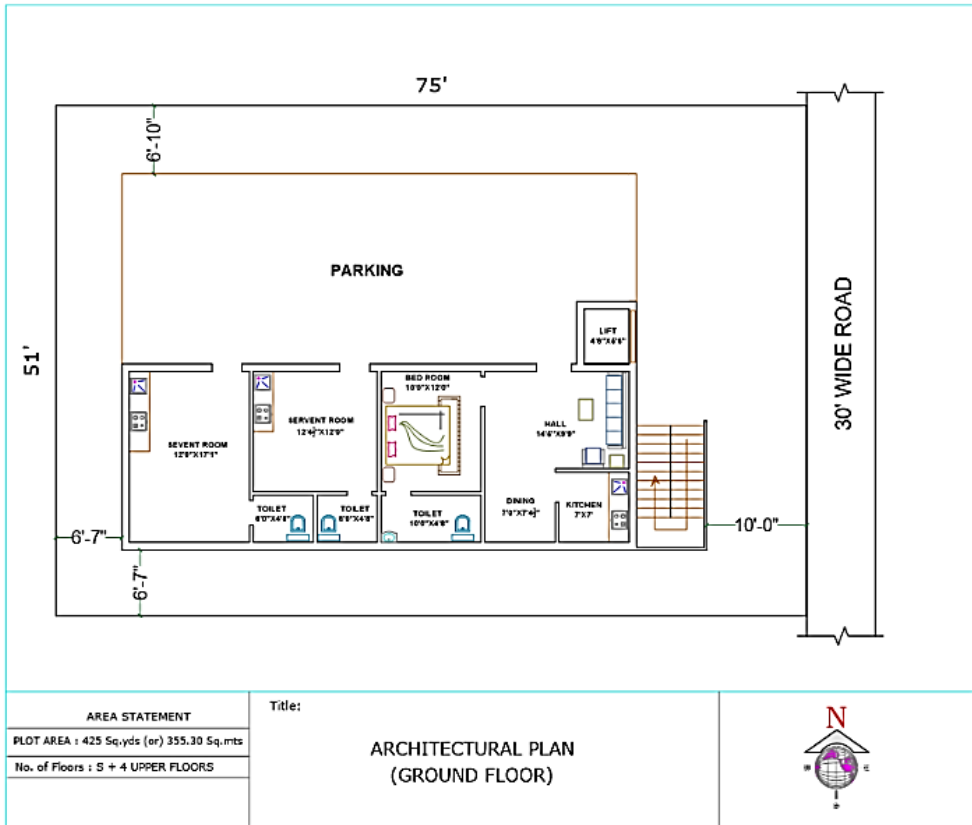
This chapter deals with the methodologies going to be dealt with and hereby addressing the objectives to be fulfilled hereafter.



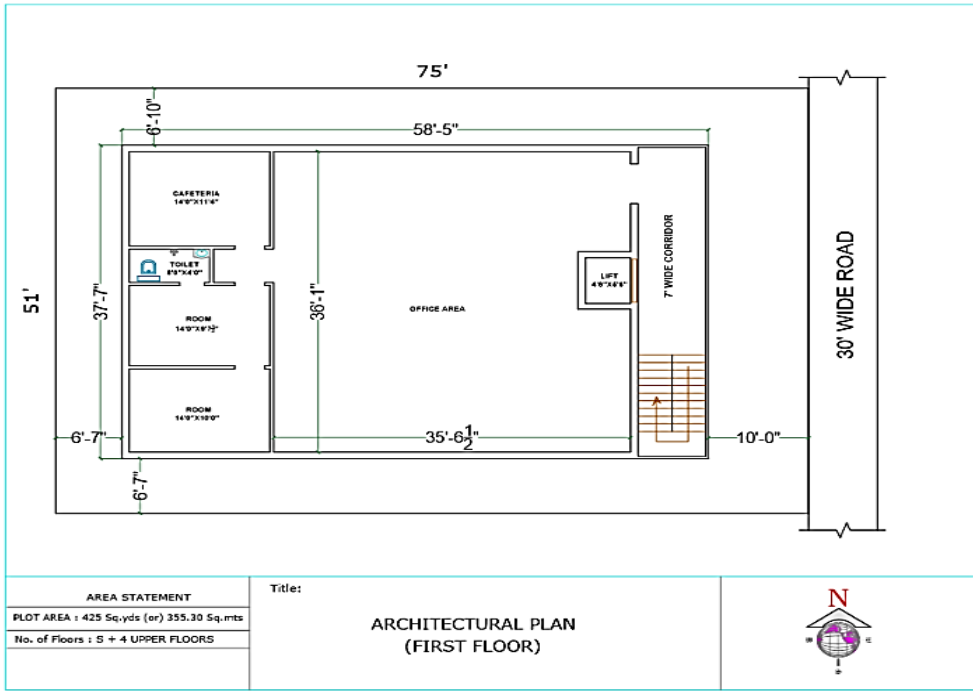
**Fig. 1:** Flow Chart for Resource Management

### 3.2 Details of the Project

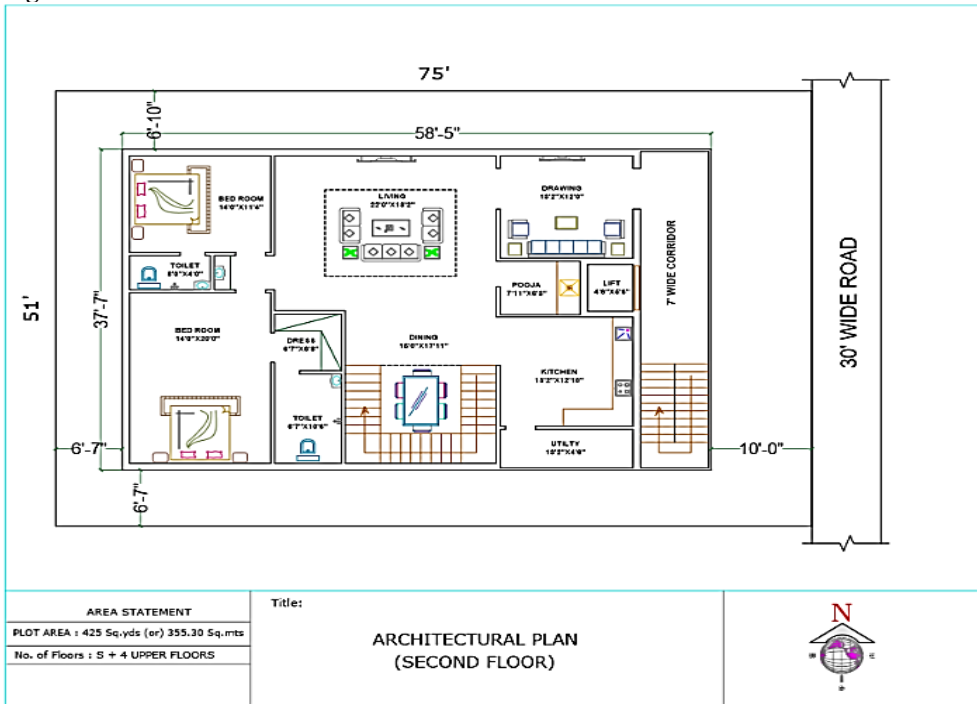
The residential building I have taken for analysing using Primavera P6 software is located in Kukatpally, Hyderabad of Telangana State where various obstructions and challenges are faced due to recent COVID 19 outbreak and non-availability of resources at the right time and labour’s non-availability due to various health problems due to COVID 19 outbreak. The building was G+4 residential luxury building which was purely built for household purposes and an office section was planned for first floor and ground floor for parking and servant quarters.



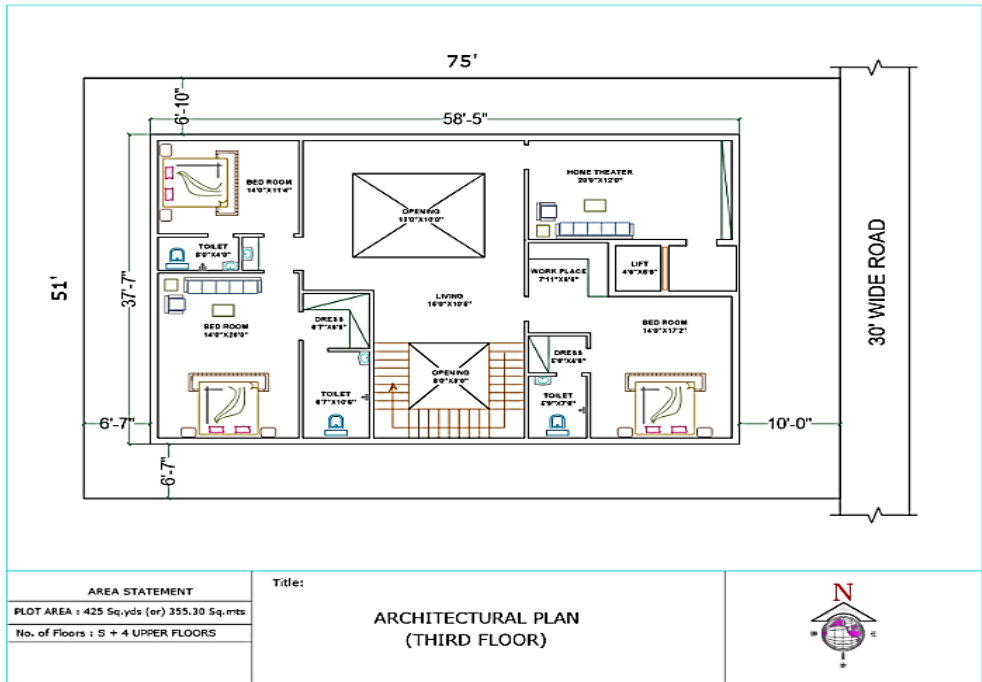
**Fig: 2.** Parking and security quarters



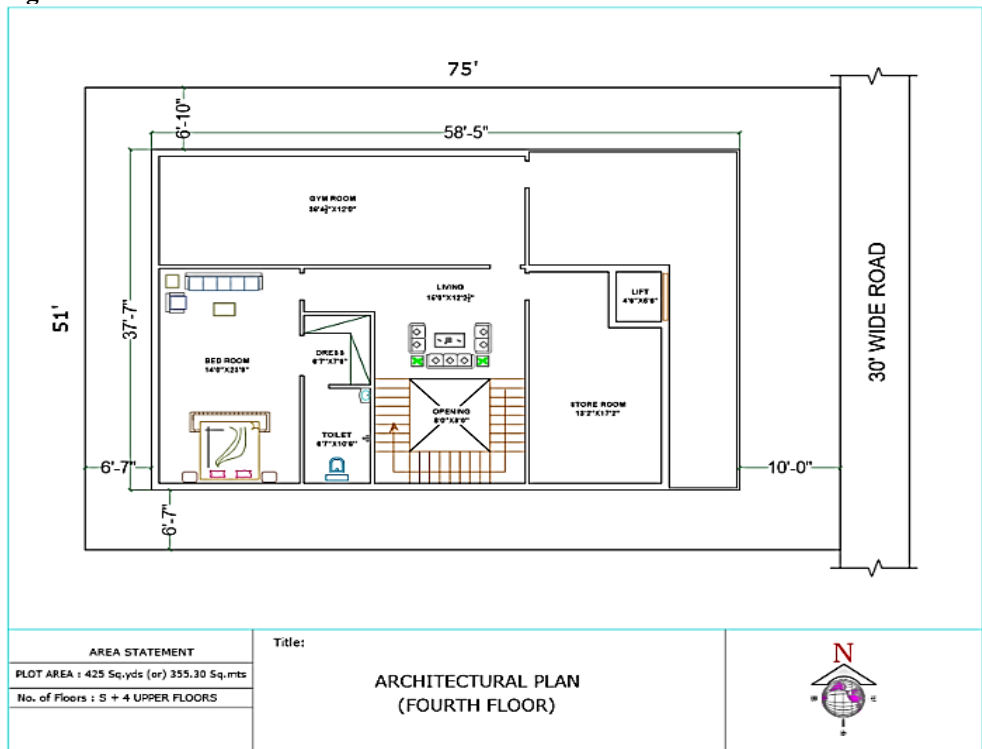
**Fig. 3.** Level 1 Floor Plan



**Fig. 4.** Level 2 Floor Plan



**Fig. 5. Level 3 Floor Plan**



**Fig. 6. Level 4 Floor Plan**

### 3.3 Work Breakdown Structure (WBS)

Work Breakdown Structure is abbreviated WBS. It is the act of compiling different works. The project's components organise or have an impact on the project's overall aim while being concerned with a particular product.

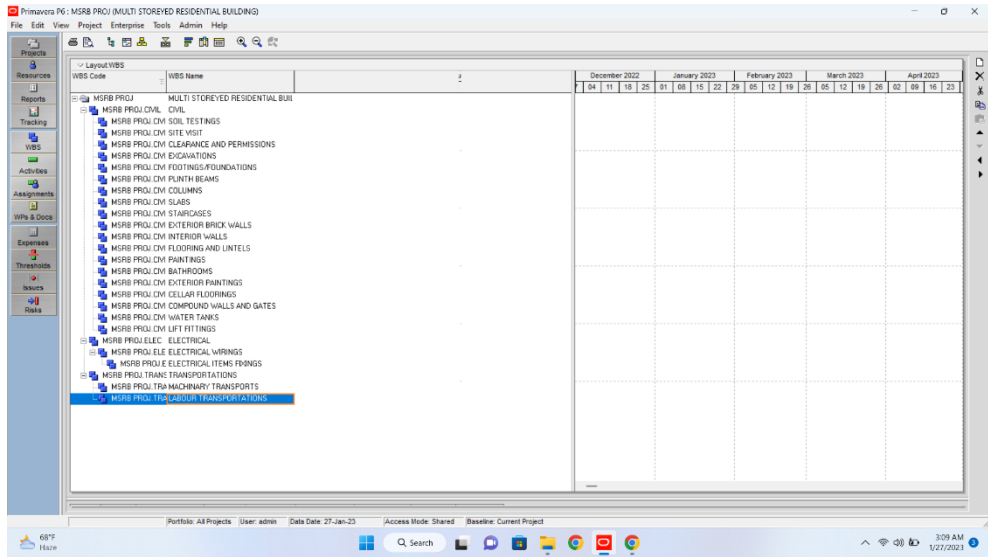
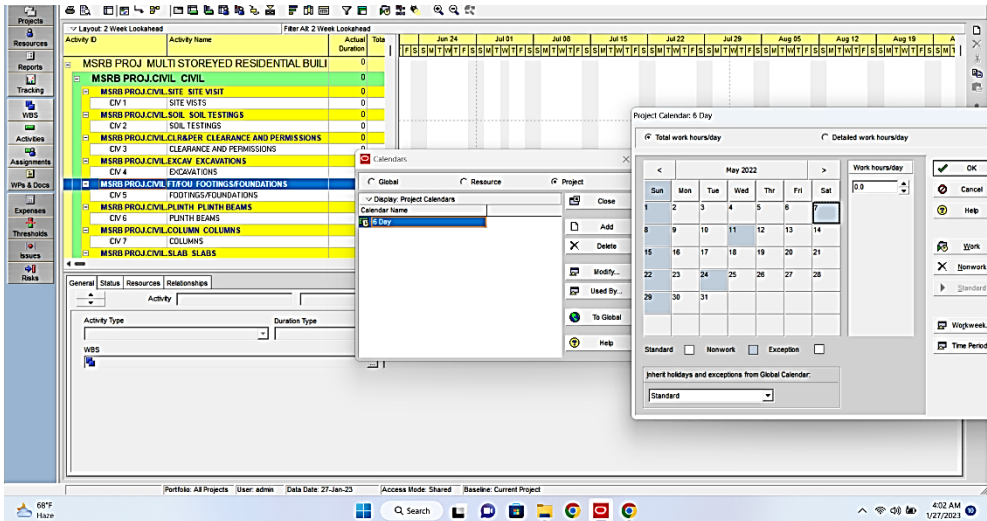


Fig: 7. WBS layout of the Project

### 3.4 Project Calendar creation

Project schedules only provide a small portion of project calendars. When used properly, days such as holidays, non-working days, exceptions, suspensions, and any other days relevant to that project can be included in the project calendars to indicate progress. While the calendars are classified into several categories depending on a number of variables, including the nation, state, and region of the proposed project, requirement, and kind of organisation.

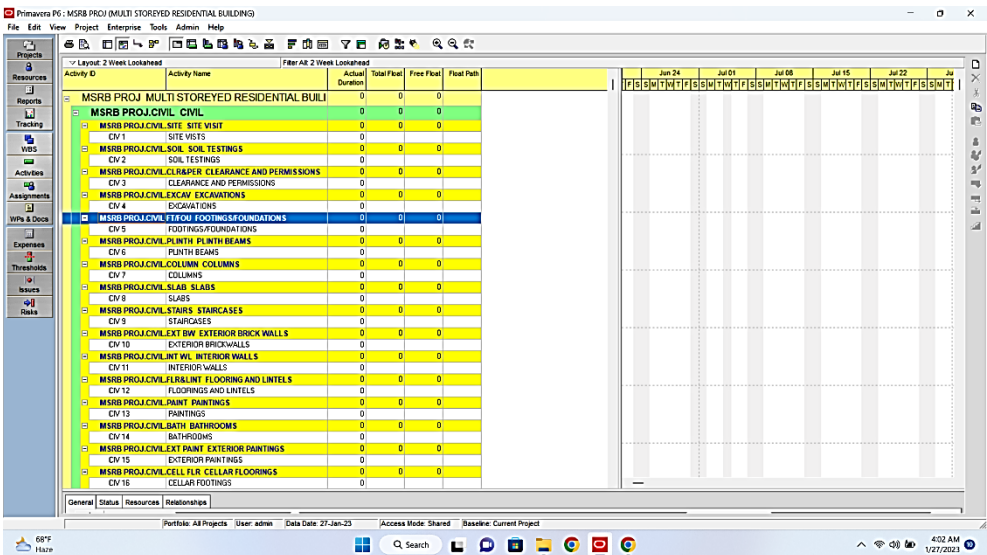




**Fig. 8.** Calendar of the Project

### 3.5 Activities of the Project

Every project and its schedule have an activity as a component; the sum of all of these different activities is the project or the schedule. The term "activity" can refer to a task or occurrence that aids in project completion. Each distinct activity has information on its duration, beginning and ending dates, as well as one or more logical connections or links.

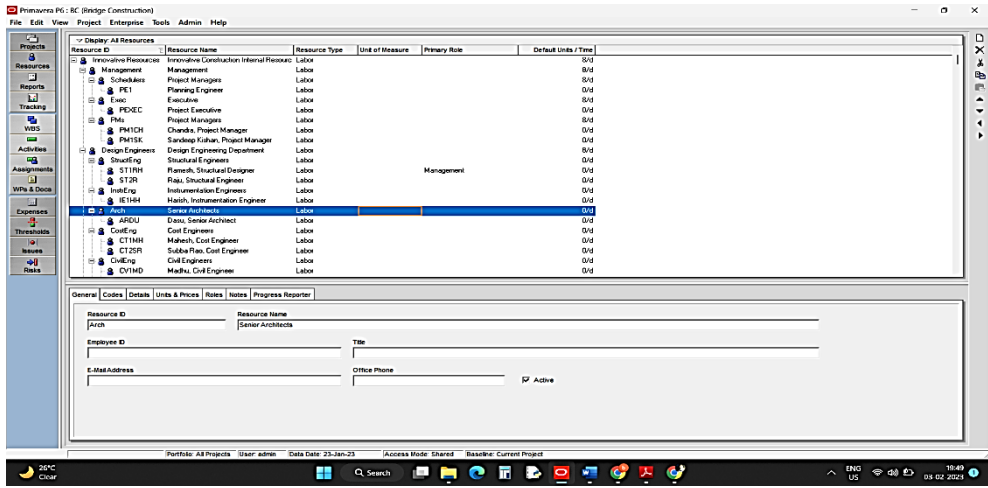


**Fig. 9.** Activities of the Project

### 3.6 Activities Resource Allocation

Resources are the people, equipment, and materials needed to complete the work. Despite the fact that not all activities require resources, the bulk of them do. For instance, healing seldom necessitates the consumption of resources. Effective resource management is

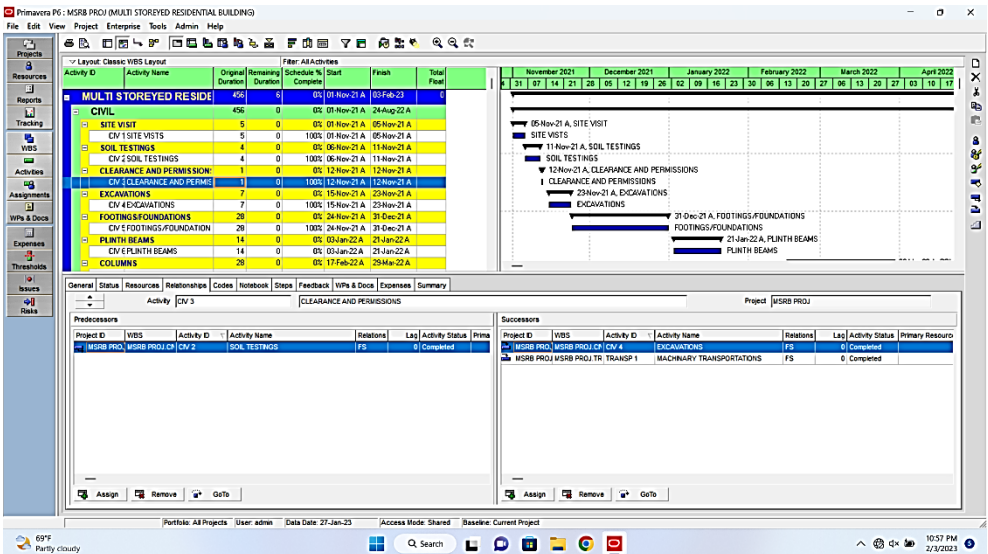
essential for the completion of construction projects, and these resources may include personnel, materials, and equipment.



**Fig. 10.** Activities Resource Allocation of the Project

### 3.7 Predecessors and Successors Allocation

Predecessors and Successors are activities that lead to start of the upcoming activity and that become the next activity in the future of the project.



**Fig. 11.** Predecessor and Successors Interface

## 4 Results

The results of the current study, when summarized, resulted in the following conclusions.:

- 1) The project is scheduled to be completed by March 1, 2021.

- 2) From the beginning to the end of the project, there are 67 activities overall, each with a different milestone.
- 3) To make sure that the activity runs successfully without going beyond budget and resources, planned float at the beginning or end of certain activities has been observed.
- 4) Concerns about variation with regard to the project's start date or end date cannot be reported if the start date and completion date threshold variations are properly monitored.

## 5 Conclusion

It can be concluded that:

The primary purpose of the research was to determine how the scheduling, planning, tracking, control and oversight impact to the efficient finish of any building venture. With the use of literature citations, original strategies, and Monitoring and Control with Primavera project management software, this conclusion was obtained. In this thesis, the research acted as a cicerone in analyzing the opulent residence constructed at Kukatpally, aiding in the identification of the several challenges encountered during or before the execution process. The production results of the current case study contradict the significance of efficient planning, scheduling, monitoring, and regulating.

The contractor estimated that the same project would take 10 months to complete. With precise and timely planning, management, execution, and monitoring of all operations using the Primavera program, the same project is still expected to be finished in 8 and a half months. The project manager in charge should be well informed of the schedule's timetable, including the activities that must begin or end on time. It is feasible to draw conclusions as a consequence of this study:

- 1) The current project's scheduled operations are successful.
- 2) The operation of extensive monitoring techniques may be carefully watched.
- 3) The many tasks involved in meeting the schedule have each been given a systematic priority.
- 4) It would be best to use a variety of materials throughout the endeavor.
- 5) The software Primavera P6 has shown to be a great and efficient solution for managing and organizing a variety of construction projects. The original design will drastically reduce the time needed for updating activities.

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