ISSN 2277-2685
IJESR/April-June. 2026/ Vol-16/Issue-2/615-622
Mr. Mohammad Mudasser *et. al.*, / International Journal of Engineering & Science Research
Full Length Article

Planning And Scheduling Of A G+6 Residential Building Using Primavera P6

Dr. T. Dhilip [*1], Dr. Khaja Fareeduddin [*2]
Mr. Mohammad Mudasser[*3], Azharuddin[*4], Mr. Mohammed Talib Faisal[*5],
Mr. Mohammed Affan Sofi[*6]
[*1] Assistant Professor, [*2] Professor & HOD Dept. Of CIVIL, Lords Institute Of Engineering And Technology
[* 3, 4, 5, 6] B.E Student Dept. Of CIVIL, Lords Institute Of Engineering And Technology
Accepted 21-04-2026

Abstract:
Application of primavera P6 in planning and scheduling of a G+6 Residential building Project. Effective planning and scheduling are critical to the successful execution of construction projects, ensuring timely completion, cost control, and optimal resource utilization. This current study focuses on the application of Primavera P6 software for planning and scheduling of G+6 Residential building project. A detailed Work Breakdown Structure (WBS) was developed to organize project activities logically. Activity durations are estimated based on standard productivity rates, construction practices, and available resources. Dependencies between activities are defined to establish the project sequence, and network diagrams were generated to identify the Critical Path. Resource allocation, including labor, materials, and equipment, was carried out to analyze resource utilization and avoid conflicts also in case of delayed activities the overall impact on the project is also assessed and appropriately rescheduled to compensate and optimize the project planning efficiently. Furthermore, the study highlights the importance of integrating planning with estimation and costing. By linking activity durations with resource requirements, engineers can forecast project expenses and cash flow requirements more accurately. This integration is particularly valuable for civil engineers working on consultancy projects, estimation reports, and residential building designs, as it supports better financial planning and project control. The results demonstrate that Primavera P6 significantly improves coordination among stakeholders, and helps in minimizing overall delays and cost overruns. The study concludes that adopting advanced project management tools like Primavera P6 in residential construction leads to better decision-making, efficient resource management, and successful project completion within planned time and budget.

Keywords*- Primavera P6, Residential Building, Construction Project Planning, Project Scheduling Work Breakdown Structure (WBS), Critical Path Method (CPM), Resource Allocation.*

1. Introduction

1.1 General Introduction

Construction projects in the modern era have become highly complex due to increasing urbanization and the demand for efficient infrastructure. A G+6 residential building involves multiple interrelated activities, requiring careful coordination and systematic execution. Therefore, the application of proper planning and scheduling techniques is essential to ensure timely and cost-effective project completion.

Planning in construction refers to the process of identifying project activities, determining their sequence, and organizing resources effectively. Scheduling involves assigning time durations to these activities and establishing logical relationships among them. Together, planning and scheduling form the backbone of project management and significantly influence the success of construction projects.

The advancement of technology has introduced powerful tools such as Primavera P6, Autodesk Revit, and Microsoft Excel, which have transformed traditional construction practices. These tools help engineers manage complex data, improve accuracy, and enhance overall project efficiency. The present project focuses on applying these tools for planning and scheduling a G+6 residential building.

2. Literature Review

Introduction to Construction Project Management

Construction project management is a systematic approach to planning, organizing, directing, and controlling construction activities to achieve specific project objectives within defined constraints. These constraints generally include time, cost, quality, safety, and scope (Project Management Institute [PMI], 2021). In modern construction practices, project management plays a crucial role in ensuring that projects are completed efficiently and effectively, especially in complex multi-storey structures such as G+6 residential buildings.

A construction project involves multiple stakeholders — owners, contractors, consultants, and suppliers — each with specific roles and responsibilities, making coordination a challenging task. Project management provides a structured framework that integrates all these components into a unified system, ensuring that all activities are aligned with the project goals and executed in a systematic manner (Kerzner, 2017).

The success of a construction project largely depends on how well it is planned and managed. Poor management can lead to delays, cost overruns, and compromised quality. Therefore, adopting scientific project management techniques is essential to handle uncertainties and complexities associated with construction projects. With the advancement of technology, tools like Primavera P6 have further enhanced the efficiency of project management practices (Liberatore et al., 2001).

3. Case Study Description- MD-Lines Residential Apartment

3.1 Introduction: -

Drawings form the fundamental basis of any construction project, as they provide a graphical representation of the proposed structure and convey detailed information required for execution. In a G+6 residential building project, both architectural and structural drawings play a crucial role in ensuring proper planning, design accuracy, and coordination among different construction activities. These drawings serve as a communication tool between architects, engineers, contractors, and other stakeholders involved in the project.

Architectural drawings primarily focus on the functional and aesthetic aspects of the building. They include floor plans, elevations, sections, and layout details that define the arrangement of spaces, dimensions, and overall appearance of the structure. Floor plans illustrate the internal layout of rooms, corridors, staircases, and other components, while elevations provide the external view of the building from different sides. Sections offer a vertical cut-through view, showing internal structural arrangements and levels. These drawings help in understanding space utilization, circulation, and design intent.

Structural drawings, on the other hand, deal with the strength, stability, and safety of the building. They include detailed layouts of structural elements such as foundations, columns, beams, slabs, and staircases. These drawings specify dimensions, reinforcement details, material specifications, and construction methods required for each component. Proper structural design ensures that the building can safely withstand loads such as dead loads, live loads, and environmental forces. The preparation of structural drawings is based on engineering principles and design standards.

In modern construction practices, drawings are often prepared using advanced software tools such as Autodesk Revit, which enable the creation of detailed and accurate 3D models. These models help in visualizing the building before construction and detecting potential design conflicts. Additionally, drawings generated through such software can be easily modified and updated, ensuring consistency across all documents.

Overall, architectural and structural drawings are essential for the successful execution of a construction project

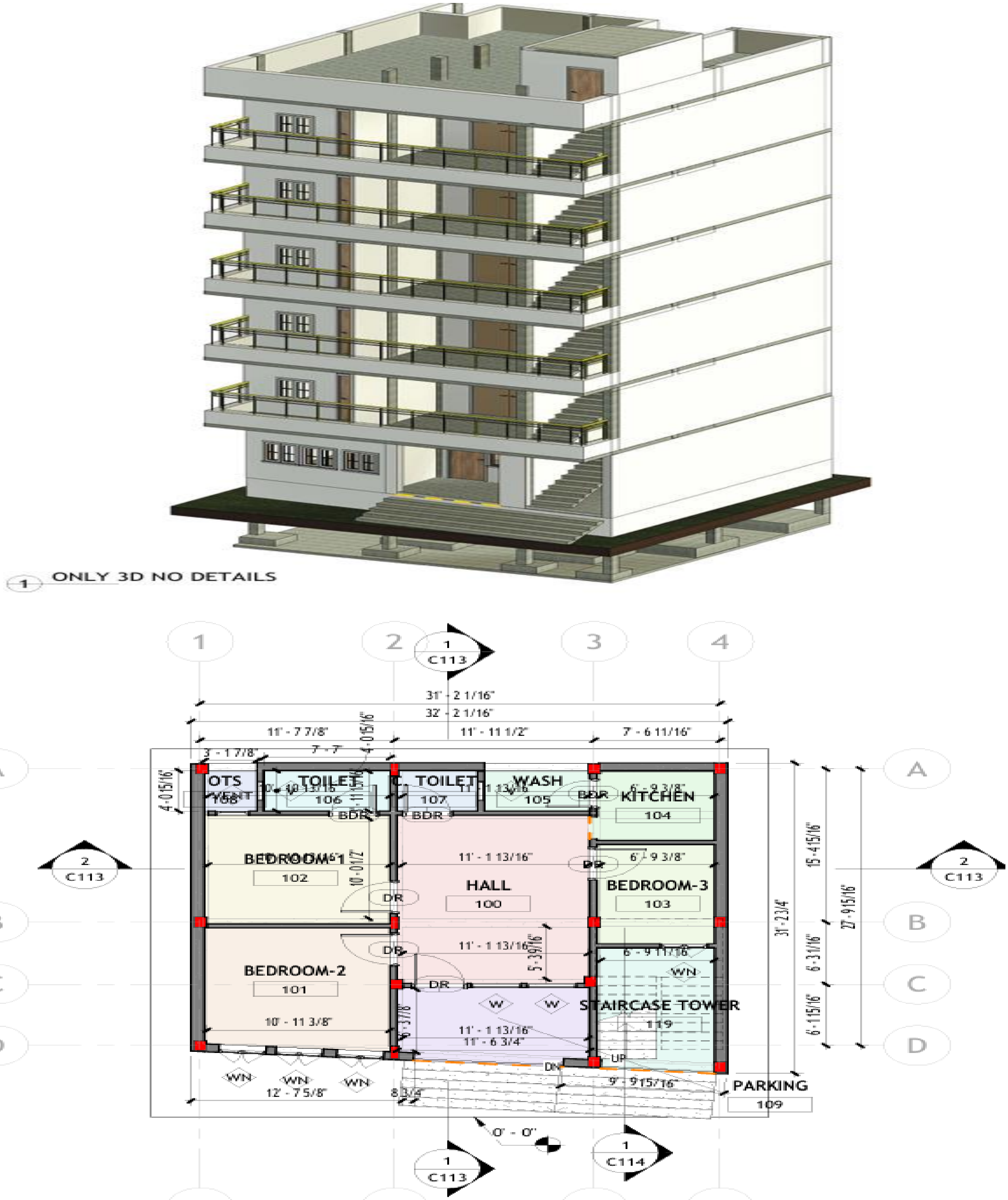


Figure 1 3D BIM model

ISSN 2277-2685
IJESR/April-June. 2026/ Vol-16/Issue-2/615-622
Mr. Mohammad Mudasser *et. al.*, / International Journal of Engineering & Science Research

4. Introduction to Primavera P6 Scheduling

Primavera P6 (P6 Professional Project Management) is the industry-standard enterprise project scheduling and management software used widely in the construction, oil & gas, engineering, and infrastructure sectors. Developed by Oracle Corporation, P6 enables project managers and planners to create, manage, and control detailed construction schedules with hierarchical Work Breakdown Structures (WBS), resource loading, cost budgeting, predecessor logic, and critical path analysis — all within a single integrated platform.

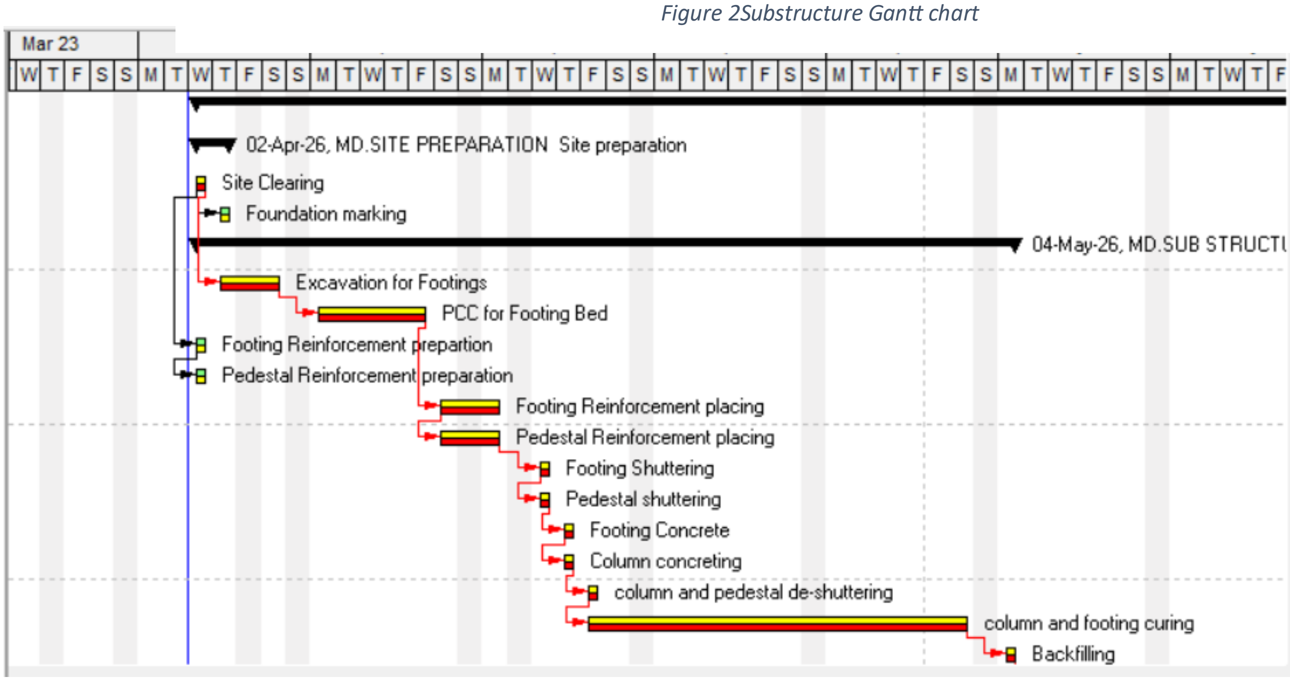
In the context of this G+6 residential building project (designated MD LINES), P6 has been used to develop a fully resource-loaded and cost-loaded construction schedule. The schedule covers all phases from initial site preparation through structural works and finishing, with 202 individual activities (Activity IDs A1000 to A1220) organized under a three-level WBS hierarchy. The total project duration as computed by P6 is 532 calendar days, commencing 01-April-2026 and completing 17-December-2027, with a total budgeted cost of Rs 78,15,804.30.

A critical observation in the sub-structure logic is the parallel preparation of footing and pedestal reinforcement (A1004, A1005) starting on Day 1 alongside site clearing, before the PCC bed is ready. This overlapping approach saves approximately 5 days on the sub-structure duration and reflects practical site sequencing where fabrication yard work runs concurrently with excavation and PCC.

Floor-Wise Construction Schedule

The super-structure follows a floor-by-floor repetitive construction cycle. Each typical floor follows the same activity sequence: Columns → Slab & Roof Beam → Staircase Tower → Brickwork, with finishing work commencing immediately after brickwork curing is complete. The schedule below summarizes the start-to-finish windows for each floor:

Figure 2Substructure Gantt chart



Floor	Phase Start	Columns Done	Slab Done	Brickwork Done	Floor Duration	Budgeted Cost
Ground Floor	05-May-26	22-May-26	20-Jul-26	30-Jul-26	72 days	Rs 8,47,520
First Floor	21-Jul-26	06-Aug-26	03-Oct-26	14-Oct-26	74 days	Rs 7,07,869
Second Floor	05-Oct-26	21-Oct-26	21-Dec-26	31-Dec-26	88 days*	Rs 7,07,869
Third Floor	22-Dec-26	07-Jan-27	09-Mar-27	02-Apr-27	88 days*	Rs 7,07,869
Fourth Floor	01-Apr-27	17-Apr-27	17-Jun-27	12-Jul-27	88 days*	Rs 7,07,869
Fifth Floor	10-Jul-27	27-Jul-27	25-Sep-27	20-Oct-27	88 days*	Rs 7,07,869
Terrace Floor	19-Oct-27	04-Nov-27	—	29-Nov-27	36 days	Rs 4,53,387

*Note: The longer duration for Floors 2–5 (88 days vs 72–74 days for GF/FF) is due to the 28-day slab curing period being the dominant constraint in each cycle. The curing activity (e.g., A1074, A1095, etc.) carries zero float and lies on the critical path, making it the primary driver of floor-cycle duration.

Resource Allocation & Cost Loading

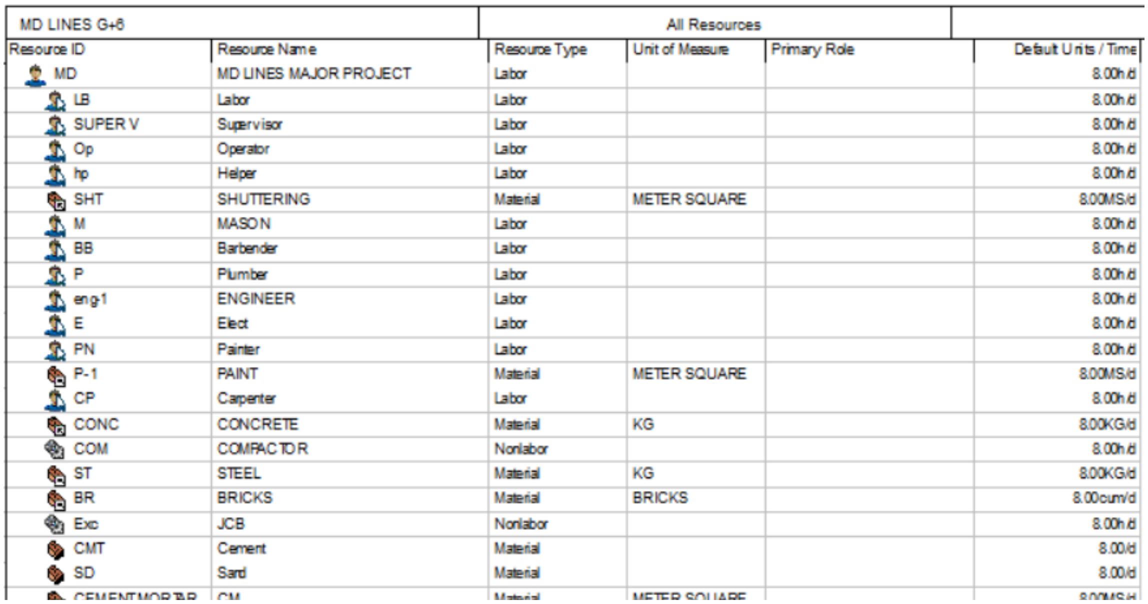
P6 allows each activity to be assigned a primary resource, enabling resource histograms and cost roll-ups. Five resource types are deployed on this project:

Resource Code	Resource Type	Role on Project	Key Activities
SUPER	Supervisor	Site supervision, layout & marking	Site Clearing, Foundation Marking
Op	Operator	JCB / heavy machinery operation	Excavation (A1002), Backfilling (A1014)
LB	Labor	Concreting, curing, PCC laying	PCC (A1003), Concreting (A1010/A1011), all Curing activities
hp	Helper	Reinforcement, shuttering, brickwork, finishes	All R/F work, shuttering, brickwork, plastering, flooring, painting
E	Electrician	Electrical rough-in and fittings	Electrical works at each floor (A1166, A1172, A1178 etc.)
P	Plumber	Plumbing rough-in and fittings	Plumbing works at each floor (A1167, A1173, A1179 etc.)

ISSN 2277-2685
IJESR/April-June. 2026/ Vol-16/Issue-2/615-622
Mr. Mohammad Mudasser *et. al.*, / International Journal of Engineering & Science Research

The budgeted cost per activity is computed in P6 by multiplying resource quantity (man-days or equipment-hours) by the respective unit rate. The highest single-activity cost in the project is the Ground Floor Brickwork (A1041) at Rs 6,27,840, reflecting the large volume of brick masonry and labour intensity over 9 days. The lowest individual activity cost is the Ground Floor Staircase Tower Reinforcement Placement (A1037) at Rs 720

5. Phase-Wise Budget Summary



MD LINES G+6		All Resources			
Resource ID	Resource Name	Resource Type	Unit of Measure	Primary Role	Default Units / Time
MD	MD LINES MAJOR PROJECT	Labor			8.00h/d
LB	Labor	Labor			8.00h/d
SUPER V	Supervisor	Labor			8.00h/d
Op	Operator	Labor			8.00h/d
hp	Helper	Labor			8.00h/d
SHT	SHUTTERING	Material	METER SQUARE		8.00MS/d
M	MASON	Labor			8.00h/d
BB	Barbender	Labor			8.00h/d
P	Plumber	Labor			8.00h/d
eng-1	ENGINEER	Labor			8.00h/d
E	Elect	Labor			8.00h/d
PN	Painter	Labor			8.00h/d
P-1	PAINT	Material	METER SQUARE		8.00MS/d
CP	Carpenter	Labor			8.00h/d
CONC	CONCRETE	Material	KG		8.00KG/d
COM	COMPACTOR	Nonlabor			8.00h/d
ST	STEEL	Material	KG		8.00KG/d
BR	BRICKS	Material	BRICKS		8.00cum/d
Exc	JCB	Nonlabor			8.00h/d
CMT	Cement	Material			8.00/d
SD	Sand	Material			8.00/d
CEMENTMORTAR	CM	Material	METER SQUARE		8.00MS/d

Figure 3 Resources used

WBS Phase	Duration	Activities	Budgeted Cost (Rs)	% of Total
Site Preparation	2 days	2	6,400	0.08%
Sub Structure	27 days	13	82,400	1.05%
Super Structure — Ground Floor	72 days	22	8,47,520	10.84%
Super Structure — First Floor	74 days	27	7,07,869	9.06%
Super Structure — Second Floor	88 days	27	7,07,869	9.06%
Super Structure — Third Floor	88 days	27	7,07,869	9.06%
Super Structure — Fourth Floor	88 days	27	7,07,869	9.06%
Super Structure — Fifth Floor	88 days	27	7,07,869	9.06%
Super Structure — Terrace	36 days	11	4,53,387	5.80%
Finishes (GF + 5 typical floors)	442 days	42	21,32,965	27.29%
Terrace Finishes	25 days	5	2,27,309	2.91%
External Plaster & Paint	14 days	2	5,25,980	6.73%
TOTAL PROJECT COST	532 days	202	78,15,804	100%

The largest cost component is the Superstructure phase at Rs 48,40,252 (62% of total), driven by reinforcement steel, concrete, shuttering, and brickwork across seven floors. Finishing works

6. Conclusion

6.1 Summary

This project undertook a comprehensive study of construction planning and scheduling for a G+6 residential building (MD LINES) through the integrated application of three industry-standard tools: Autodesk Revit for Building Information Modelling (BIM) and 3D design, Microsoft Excel for detailed quantity estimation and Bill of Quantities preparation, and Primavera P6 Professional for project scheduling, resource allocation, cost loading, and critical path analysis.

The project began with the development of architectural and structural drawings in Revit, from which quantities were systematically extracted. A detailed Bill of Quantities was then prepared in Excel.

These inputs fed into Primavera P6, where a 4-level Work Breakdown Structure (WBS) was constructed, 202 activities were defined and sequenced with logical relationships, six resource types were assigned, and cost loading was applied to each activity. The resulting schedule spans 532 calendar days from 01-April-2026 to 17-December-2027 at a total baseline budgeted cost of Rs 78,15,804. The complete Gantt chart, baseline, and S-curve derived from this exercise provide a fully integrated project management deliverable for the G+6 residential building.

6.2 Conclusions

The following statistical and value-based conclusions are drawn from this study:

1. The total project duration of 532 calendar days was governed primarily by mandatory curing periods, which alone account for approximately 280 days — 53% of the total project duration. The 28-day slab curing at each of the six floors contributes 168 non-compressible critical days, making curing the single most dominant schedule constraint in multi-storey residential construction.
2. The total baseline project cost of Rs 78,15,804 is distributed with the Superstructure (G+6 floors) commanding 62% of total cost (Rs 48,40,252), Finishing works at approximately 30% (Rs 23,60,773), and Site Preparation and Substructure together comprising only 1.1% — a cost distribution pattern consistent with industry benchmarks for multi-storey residential buildings.
3. The floor-by-floor overlapping strategy — whereby finishing works commence at a completed floor while structural works continue on upper floors — resulted in a schedule saving of approximately 9–10 months compared to a purely sequential construction approach. This highlights the critical value of activity parallelism in high-rise residential scheduling.
4. Ground Floor Superstructure emerges as the most expensive single structural phase at Rs 8,47,520, which is 19.8% higher than the Rs 7,07,869 cost of each typical upper floor, owing to the additional plinth beam and layout work at foundation level.
5. The single most cost-intensive work package per floor is Brickwork: Ground Floor Brickwork (Activity A1041) alone costs Rs 6,27,840 — representing 80% of the Ground Floor superstructure direct labour and material cost — underscoring the need for early procurement planning and uninterrupted labour deployment for masonry.
6. MEP (Mechanical, Electrical, and Plumbing) activities carry significant positive float and are confirmed as non-critical at every floor level. This finding enables flexible MEP deployment without risk to the project completion date — a scheduling advantage unique to the P6 logic-linked network approach that a simple bar chart would fail to reveal.
7. The integration of Revit, Excel, and Primavera P6 in a single project workflow demonstrates that BIM-to-schedule data flow is feasible at the undergraduate level and yields a measurably more accurate and audit-ready project management deliverable than conventional manual methods.

6.3 Limitations of the Study

Despite the comprehensive scope of this project, the following limitations are acknowledged:

- The study is confined to the planning and scheduling phase only; actual site execution, real-time progress monitoring, and earned value management (EVM) updates were not carried out, as the project exists solely as a planned model.
- Resource unit rates and material prices used in cost loading are assumed values based on standard schedules of rates and do not reflect site-specific market fluctuations or current tender prices, which may vary considerably by region and time.
- The Revit model, while providing architectural and structural geometry, was not fully integrated with P6 through a 4D BIM link (e.g., Synchro or Navisworks). The data transfer from Revit to P6 was performed manually via Excel, introducing a potential for manual errors in activity mapping.
- Weather delays, labour productivity variations, material supply chain disruptions, and unforeseen site conditions — all of which significantly affect real-world schedules — have not been modelled in the P6 baseline, as this would require probabilistic risk analysis tools beyond the scope of this study.
- The quantity estimation in Excel was prepared based on drawing dimensions and standard formulae; minor inaccuracies in take-off quantities could propagate into cost deviations in the P6 budget.

6.4 Future Scope of The Study

The present work provides a strong foundation for several directions of future research and professional application:

- The schedule can be extended into a live 4D BIM simulation by linking the Revit model directly to Primavera P6 through tools such as Synchro Pro or Autodesk Construction Cloud, enabling time-lapsed visual tracking of construction progress against the baseline.
- A Monte Carlo risk simulation can be overlaid on the P6 schedule to quantify schedule and cost uncertainty, providing probabilistic completion dates and contingency budgets — an extension particularly valuable for client-facing project proposals.

- The Excel-based quantity estimation can be replaced or validated with Revit's native quantity take-off and cost estimation plugins (e.g., Autodesk Quantity Takeoff), reducing manual data transfer and improving BIM-to-cost accuracy.
- The methodology demonstrated in this project can be replicated for larger or different building typologies — such as commercial complexes, hospitals, or infrastructure projects — to assess scalability and identify scheduling differences across project categories.
- Future studies may incorporate actual construction progress data to perform earned value analysis (EVM) in P6, comparing planned vs. actual cost and schedule performance indices (CPI and SPI) — thereby completing the full project control lifecycle.

References

1) Atin, S., & Lubis, R. (2019). Implementation of critical path method in project planning and scheduling. IOP Conference Series: Materials Science and Engineering, 662, 022031. https://doi.org/10.1088/1757-899X/662/2/022031
2) Dhinesh, M., Kaleeswaran, S., & Ashok Manikandan, S. (2017). Planning, scheduling and tracking of residential building using project management software. SSRG International Journal of Civil Engineering – ICRTCETM-2017 Special Issue (April), 1–6.
3) Haugan, G. T. (2002). Effective work breakdown structures. Management Concepts.
4) Kadiyala, M., Tharunika, S. B., & Ramesh Kannan, M. (2020). Planning and scheduling of a multi-storey building using Primavera P6. International Research Journal of Engineering and Technology (IRJET), 7(11), 1–7. https://www.irjet.net
5) Kerzner, H. (2017). Project management: A systems approach to planning, scheduling, and controlling (12th ed.). John Wiley & Sons.
6) Kim, K. (2020). Generalized resource-constrained critical path method to improve sustainability in construction project scheduling. Sustainability, 12(21), Article 8918. https://doi.org/10.3390/su12218918
7) Liberatore, M. J., Pollack-Johnson, B., & Smith, C. A. (2001). Project management in construction: Software use and research directions. Journal of Construction Engineering and Management, 127(2), 101–107. https://doi.org/10.1061/(ASCE)0733-9364(2001)127:2(101)
8) Meredith, J. R., & Mantel, S. J. (2012). Project management: A managerial approach (8th ed.). John Wiley & Sons.
9) Narlawar, G. S., Chaphalkar, N. B., & Sandbhor, S. (2019). Application of Primavera software in time and resource management of construction project: A review. International Journal of Scientific & Technology Research, 8(8), 869–875. https://www.ijstr.org
10) Olsen, D., & Taylor, J. M. (2017). Quantity take-off using building information modeling (BIM), and its limiting factors. Procedia Engineering, 196, 1098–1105. https://doi.org/10.1016/j.proeng.2017.08.067
11) Patil, V. P., Sushma, R. K., Bhattarai, B., Kumar, M., Mahato, C. B., & Ansari, M. I. (2022). Planning and scheduling of college building by using Primavera P6. International Journal of Engineering Research & Technology (IJERT), 10(10), 1–6. https://www.ijert.org
12) Pawar, H., Wagh, R., Shahane, S., Kakad, M., Kakad, V., & Bodke, S. S. (2018). Planning and scheduling of high-rise building using Primavera. International Journal of Scientific Research in Science, Engineering and Technology, 4(4), 533–537. https://doi.org/10.32628/IJSRSET
13) Project Management Institute. (2021). A guide to the project management body of knowledge (PMBOK® Guide) (7th ed.). Project Management Institute.
14) Reddy, P. R., & Naik, B. H. (2016). Planning and resource scheduling of residential (G+7) project using Primavera. International Journal of Innovative Research in Science, Engineering and Technology, 5(10), 17801–17808. https://doi.org/10.15680/IJIRSET.2016.0510020
15) Shick Alshabab, M., Vysotskiy, A., Petrichenko, M., & Khalil, T. (2020). BIM-based quantity takeoff in Autodesk Revit and Navisworks Manage. In A. Borovkov et al. (Eds.), Proceedings of EECE 2019 (Lecture Notes in Civil Engineering, Vol. 70, pp. 381–390). Springer. https://doi.org/10.1007/978-3-030-42351-3_36.