

# Analysis Of Cost Overrun In G+3 Residential Building Using Primavera P6

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## Abstract:

Construction cost overrun is one of the most persistent challenges in the residential building industry in India, with studies consistently showing that 60–70% of projects exceed their original budgets. The present study investigates and analyses cost overrun in a G+3 (Ground Plus Three Floors) residential building project using Oracle Primavera P6 Professional project management software. A detailed project schedule comprising 87 activities across six Work Breakdown Structure (WBS) levels — Foundation Construction, Ground Floor, First Floor, Second Floor, Third Floor, and Finishing Works — was developed in Primavera P6 for a building project with a planned duration of 550 working days, commencing 27th March 2026 and targeted for completion on 4th May 2028. A primary baseline was formally created and assigned as the approved plan of record. Construction progress was updated to the data date of 14th April 2026, at which point two foundation activities were completed on schedule and one was in progress. The study demonstrates that Primavera P6's activity-level cost tracking, baseline comparison reporting, Critical Path Method (CPM) scheduling, and progress updating capabilities are effective tools for identifying and quantifying cost overrun in residential construction projects. Corrective and preventive recommendations are formulated, including baseline revision, material procurement planning, and adoption of formal progress monitoring cycles.

**Keywords:** Cost Overrun, Primavera P6, G+3 Residential Building, Baseline Schedule, Work Breakdown Structure, Construction Project Management, Critical Path Method.

## 1. INTRODUCTION

The construction industry is one of the most significant sectors of the global economy, contributing substantially to national income and employment generation. In a developing nation like India, the sector is witnessing unprecedented growth driven by rapid urbanisation, population expansion, and an ever-increasing demand for residential and commercial spaces. Residential construction, in particular, forms the backbone of this growth as millions of families aspire to own homes in urban and semi-urban centres.

The problem is especially pronounced in residential building projects. Unlike large infrastructure projects, residential constructions are often undertaken by private developers with limited access to sophisticated project management tools. Inadequate planning, poor resource allocation, fluctuating material costs, labour unavailability, and the absence of real-time progress monitoring are among the principal contributors to budget overruns. The consequences are multi-dimensional: developers incur financial losses, buyers face delayed possession, and lenders are exposed to elevated credit risk.

Against this backdrop, the present study investigates

cost overrun in a G+3 (Ground Plus Three Floors) residential building project using Oracle Primavera P6 — a professional project planning and scheduling software recognised globally for its capability to plan, schedule, monitor, and control construction projects. A detailed project schedule encompassing all construction activities has been developed, a primary baseline established as the approved plan of record, construction progress updated to reflect actual site conditions, and cost overrun quantified and analysed at both the project and floor levels.

## 1.2 Overview of the Construction Industry in India

India's construction industry is the second-largest employer in the country after agriculture, providing livelihoods to over 50 million workers, both skilled and unskilled. The sector contributes approximately 9% to the national GDP and is expected to grow substantially over the next two decades, driven by government initiatives such as the Pradhan Mantri Awas Yojana (PMAY), Smart Cities Mission, and the Atal Mission for Rejuvenation and Urban Transformation (AMRUT).

The residential housing segment alone accounts for a substantial portion of total construction output.

India requires approximately 20 million additional urban housing units to meet current demand. In Tier-2 and Tier-3 cities, the demand for mid-range multi-storey residential buildings such as G+2, G+3, and G+4 structures is particularly high due to affordability and land constraints. These building typologies are typically executed by small-to-medium contractors with limited formal project management experience.

Despite the scale and importance of the sector, productivity in Indian construction remains significantly lower than international benchmarks. A major reason for this productivity gap is the lack of structured project management practices. Most projects are managed using traditional methods — manual bar charts, ledger-based cost tracking, and informal labour supervision — which are insufficient for detecting deviations from planned schedules and budgets in a timely manner.

The adoption of modern project management software such as Primavera P6 has been largely confined to large infrastructure projects and Tier-1 contractors. There exists a significant opportunity — and need — to extend such tools to the residential construction segment, where cost and schedule overruns are arguably more damaging in proportion to project size.

### 1.3 Concept of Cost Overrun — Definition, Types, and Significance

#### 1.3.1 Definition

Cost overrun, also referred to as cost escalation or budget overrun, is defined as the excess of actual project cost over the originally sanctioned or budgeted amount at the time of project initiation. It is mathematically expressed as:

$$\text{Cost Overrun (\%)} = \frac{[(\text{Actual Cost} - \text{Budgeted Cost}) / \text{Budgeted Cost}] \times 100$$

In the present study, the variance between the originally budgeted cost and the approved baseline cost recorded in Primavera P6 forms the principal measure of cost overrun. This variance is further disaggregated at the Work Breakdown Structure (WBS) level — corresponding to each floor of the building — to identify the zones of maximum deviation. The detailed cost comparison is presented in Chapters 4 and 5, and the full baseline schedule report is provided as Annexure A to this report.

#### 1.3.2 Types of Cost Overrun

Cost overruns in construction projects can be broadly classified into the following categories:

- **Scope Creep-Induced Overrun:** Occurs when the scope of work is expanded after the baseline budget is set without a corresponding revision of the cost plan. This is one of the most common causes in residential projects where clients frequently request design changes mid-construction.
- **Material Cost Escalation:** Fluctuations in the prices of key construction materials such as cement, steel reinforcement bars, bricks, and aggregates can

significantly inflate actual costs beyond budgeted amounts, particularly in the volatile Indian market.

- **Labour Cost Overrun:** Unanticipated increases in wage rates, labour shortages, and low productivity resulting in extended activity durations contribute to labour cost escalation.
- **Equipment and Machinery Overrun:** Additional hire charges for equipment such as concrete mixers, vibrators, and scaffolding, particularly when activities are delayed and hire periods are extended beyond the planned duration.
- **Overhead and Indirect Cost Overrun:** Extended project durations increase overhead costs including site establishment, supervision, insurance, and financing charges.
- **Contingency Inadequacy:** Inadequate provision for unforeseen events such as soil problems, utility conflicts, monsoon delays, and legal disputes leads to overruns when such events materialise during construction.

#### 1.3.3 Significance of Studying Cost Overrun

Understanding the magnitude, timing, and causes of cost overruns enables project managers and contractors to take proactive and corrective action. Specifically, a structured cost overrun analysis allows practitioners to:

- Establish realistic contingency budgets for future similar residential projects.
- Identify high-risk activities and work packages that are prone to cost deviation.
- Implement targeted corrective measures before overruns escalate beyond recoverable limits.
- Improve cash flow management by anticipating expenditure peaks at critical construction stages.
- Enhance stakeholder communication through transparent, data-supported cost reporting.

#### 1.4 Need and Importance of the Present Study

The present study is motivated by both practical and academic considerations. On the practical side, the project under investigation is a G+3 residential building for which a detailed schedule has been developed in Primavera P6, a baseline has been established as the plan of record, and actual construction progress has been updated — making it an authentic, data-rich case for a live cost overrun investigation.

On the academic side, while considerable research has been conducted globally on cost overrun in construction projects, studies specifically focused on small-to-medium residential buildings in the Indian context, using Primavera P6 as the planning and analysis tool, are relatively limited. This study contributes to filling that gap by providing a floor-wise, activity-level analysis of cost variance for a real, ongoing project.

Furthermore, the study is important from a pedagogical perspective. As final-year Civil Engineering students, understanding the intersection

of cost engineering, project scheduling, and software-based analysis equips practitioners with skills that are directly applicable to professional practice. The ability to develop a Primavera P6 schedule, create and assign a baseline, update construction progress, and interpret cost variance reports is a core competency for project engineers and site managers in the modern construction industry.

The importance of the study is further underscored by the following industry observations:

- Approximately 60–70% of construction projects in India experience some degree of cost overrun.
- Average cost overruns in residential building projects in India range between 10% and 25% of the original budget, depending on project complexity and management quality.
- The systematic use of project management software has been shown to reduce cost overruns by 15–20% in projects where it is consistently and properly applied.

### 1.5 Objectives of the Study

The following specific objectives have been formulated to guide this research:

- To prepare a detailed project schedule for a G+3 residential building using Oracle Primavera P6, incorporating all construction activities across six Work Breakdown Structure levels — from site clearance through to finishing works.
- To establish a primary baseline schedule and cost plan in Primavera P6, serving as the approved reference against which project performance is measured.
- To update construction progress in Primavera P6 and assess schedule completion status of all activities as of the current data date.
- To identify and quantify cost overrun at both the overall project level and at each individual WBS level — Foundation, Ground Floor, First Floor, Second Floor, Third Floor, and Finishing Works.
- To analyse the schedule performance of completed and in-progress activities and assess their contribution to overall cost variance.
- To identify the principal causes of cost overrun observed in the project and recommend corrective and preventive measures applicable to similar residential building projects.
- To demonstrate the capability of Primavera P6 as an effective tool for schedule development, baseline management, progress updating, and cost overrun analysis in residential construction.

### 1.6 Scope of Work

The scope of the present study covers the complete construction life cycle of a G+3 residential building — from initial site preparation activities through to final finishing and external works. The project schedule has been developed in Oracle Primavera P6

and is structured around six primary Work Breakdown Structure (WBS) elements, each corresponding to a distinct phase of construction:

- Foundation Construction — encompasses site cleaning, earthwork excavation, brick work in foundation, Plain Cement Concrete (PCC), Reinforced Cement Concrete (RCC) footings, plinth beam construction, and column starters.
- Ground Floor (GF) Structural Work — covers all structural activities from dressing for PCC through to the completion of the ground floor slab, including column, beam, and slab reinforcement, shuttering, and concreting.
- First Floor (FF) — structural column and slab works following the ground floor completion, with provision for embedded electrical conduits within the slab.
- Second Floor (2ND FL) — same structural sequence as the first floor, repeated for the second level of the building.
- Third Floor (3rd FL) — final structural floor, completing the full reinforced concrete frame of the building.
- Finishing Works (FNSH) — all post-structural activities including block work, internal and external plastering, flooring, railing works, door and window fixing, interior painting, electrical fixtures, sanitary and water supply works, and cladding.

The study encompasses three core project management activities executed within Primavera P6: (i) schedule development — defining all activities, durations, and logical relationships; (ii) baseline creation — freezing the approved plan as the reference schedule; and (iii) progress updating — recording actual site conditions as of the data date. Cost overrun analysis is conducted for activities and WBS elements where a variance between the budgeted cost and the baseline cost exists. The complete baseline schedule report is included as Annexure A.

### 1.7 About the Project — G+3 Residential Building

The project that forms the basis of this study is a G+3 residential building comprising a ground floor and three upper floors — one of the most commonly constructed residential typologies in Indian cities and towns, offering a cost-effective solution for multi-family accommodation within a compact footprint. Such buildings typically house two to four residential units per floor, with common staircases, corridors, and shared utilities.

The building structure follows a conventional Reinforced Cement Concrete (RCC) framed construction approach, with brick masonry infill walls. The structural sequence for each floor follows a consistent and repetitive pattern: Column Starter Marking → Column Starter Concreting → Reinforcement for Columns → Shuttering for Columns → RCC for Columns → Reinforcement

for Slab → Shuttering for Slab → Electrical Conduit Provision → RCC for Slab and Beams. This floor-by-floor repetition makes the project particularly suitable for comparative cost and schedule analysis across floors, as deviations in one floor's performance can be meaningfully benchmarked

against others.

The project encompasses 87 individual construction activities spread across the six WBS levels, covering every stage of work from initial site clearance to external plastering and cladding. The project summary is presented in Table 1.1 below:

Project Parameter	Details
Project Name	G+3 Residential Building
Planned Start Date	27th March 2026
Planned Finish Date	4th May 2028
Original Duration	550 Working Days
Total Number of Activities	87 Activities across 6 WBS Levels
WBS Levels	6 — Foundation, GF, FF, 2nd Floor, 3rd Floor, FNSH
Structural System	RCC Framed Structure with Brick Masonry Infill
Baseline Assigned	Primary Baseline — approved plan of record
Software Used	Oracle Primavera P6 Professional
Data Date	14th April 2026

Table 1.1: G+3 Residential Building — Project Summary

Each of the six WBS levels represents a distinct and sequential phase of construction, with predecessor-successor relationships linking activities across phases to form a coherent project network. The foundation works are partially complete as of the current data date, with site cleaning and earthwork excavation fully completed and brick work in foundation currently in progress. All remaining activities — spanning the four structural floors and the finishing works phase — are yet to commence and form the subject of the forward-looking schedule and cost analysis presented in Chapters 4 and 5.

**1.8 Overview of Oracle Primavera P6 Software**

Oracle Primavera P6 Professional Project Management is an industry-leading enterprise project portfolio management software widely used across the construction, engineering, oil and gas, and manufacturing sectors. It is designed to support the complete project management life cycle — from initial planning and resource allocation through to schedule monitoring, cost control, and project close-out.

Primavera P6 was developed by Primavera Systems Inc., which was subsequently acquired by Oracle Corporation in 2008. Since its acquisition, the software has been continuously enhanced and expanded. It supports projects of varying size and complexity — from a handful of activities to hundreds of thousands — and is capable of managing multiple projects simultaneously within a

single enterprise environment. For the present study, Primavera P6 serves as both the project development platform and the primary analytical tool.

**2. LITERATURE REVIEW**

**2.1 Introduction**

A comprehensive review of existing literature is essential to establish the theoretical foundation upon which the investigation is built, identify methods previously adopted by researchers, and delineate the gaps that the present work seeks to address. This chapter presents a structured review of published research pertaining to three thematic areas directly relevant to the study: (i) the nature, causes, and consequences of cost overrun in construction projects; (ii) the role of scheduling, baseline management, and progress updating in controlling cost escalation; and (iii) the application of Oracle Primavera P6 software in construction project planning and cost monitoring.

The review draws from peer-reviewed journal articles, conference proceedings, and academic theses published between 2002 and 2024. The studies cited span India, the Middle East, South-East Asia, Africa, and Europe, reflecting the global universality of cost overrun as a construction management challenge.

Odeck (2004) analysed Norwegian road construction projects and concluded that cost overruns were positively correlated with project size and duration, suggesting that longer and more complex projects are inherently more susceptible to

budget deviation. This finding is particularly significant for multi-storey residential projects, where the extended construction timeline — often spanning 18 to 30 months — creates multiple windows of vulnerability for cost escalation across successive construction phases.

Cantarelli, Flyvbjerg, Molin, and van Wee (2010) categorised the causes of cost overrun into four primary explanations: technical factors (design errors, quantity underestimations, unforeseen ground conditions), economic factors (price escalation, financing costs), psychological factors (optimism bias), and political factors (deliberate underestimation to secure approval). Their taxonomy remains one of the most widely cited frameworks in construction cost overrun literature and is adopted as a reference in the present study.

Doloi, Sawhney, Iyer, and Rentala (2012) applied structural equation modelling to analyse delay and cost overrun in Indian construction projects, establishing strong causal relationships between planning inadequacy, resource unavailability, and eventual cost escalation. Their study emphasised that projects without formal scheduling tools were approximately 1.8 times more likely to experience significant cost overruns compared to those using software-based planning and monitoring.

### 3. METHODOLOGY AND PROJECT DATA

#### 3.1 Research Methodology Adopted

The present study follows a case study research methodology, which is widely accepted in construction management research for investigating real-world project phenomena within their actual context. A single G+3 residential building project has been selected as the case, and all analysis is grounded in the project schedule and cost data developed and maintained within Oracle Primavera P6. The methodology does not rely on survey instruments, questionnaires, or simulated data; instead, it is entirely based on the planned and progress-updated schedule of the actual project.

The research methodology is structured in four sequential stages, each building upon the output of the previous:

- **Schedule Development:** All construction activities are identified, defined, and logically sequenced

within Primavera P6. Durations are assigned to each activity based on standard construction norms and the scope of work at each stage. Activity relationships are established to form a coherent project network.

- **Baseline Creation:** Once the schedule is complete and approved as the plan of record, it is frozen as the primary baseline within Primavera P6. This baseline represents the contractual reference schedule and cost plan against which all future performance is measured.
- **Progress Updating:** Actual construction progress is entered into Primavera P6 against the data date of 14th April 2026. Actual start dates, actual finish dates, and revised remaining durations are recorded for all activities that have commenced or been completed, while activities not yet started retain their baseline planned dates.
- **Cost Overrun Analysis:** The budgeted costs assigned to each activity and WBS element are compared against the baseline plan. Deviations — whether positive (overrun) or negative (under-run) — are identified, quantified, and discussed. The analysis is presented only for activities and WBS elements where a cost variance exists; activities with zero variance are confirmed as on-plan.

This four-stage approach mirrors the standard practice of professional project management using Primavera P6 and ensures that the findings are grounded in real, software-generated data rather than estimates or assumptions.

#### 3.2 Project Calendar and Key Dates

The project calendar defines the working days, working hours, and non-working periods that govern activity scheduling in Primavera P6. The calendar settings adopted for this project are as follows:

- **Working Days:** Six days per week (Monday through Saturday). Sunday is designated as a non-working day.
- **Working Hours:** Eight hours per day, constituting a standard construction working shift.
- **Calendar Type:** The project uses a standard 6-day working week calendar, which is the typical convention for residential building construction in India.

The key milestone dates for the project, as established in the Primavera P6 schedule, are presented in Table 3.1 below:

S.No	Milestone Description	Planned Date	Status
1	Project Commencement	27th March 2026	Commenced
2	Completion of Foundation Works	30th April 2026	In Progress
3	Completion of Ground Floor Slab	11th September 2026	Not Yet Started

S.No	Milestone Description	Planned Date	Status
4	Completion of First Floor Slab	11th January 2027	Not Yet Started
5	Completion of Second Floor Slab	11th May 2027	Not Yet Started
6	Completion of Third Floor Slab	8th September 2027	Not Yet Started
7	Commencement of Finishing Works	8th September 2027	Not Yet Started
8	Planned Project Completion	4th May 2028	Planned
9	Data Date (Progress Update As-Of Date)	14th April 2026	Current

Table 3.1: Project Key Milestone Dates

The project has a planned total duration of 550 working days, commencing on 27th March 2026 and targeted for completion on 4th May 2028. As of the data date of 14th April 2026, the project is 18 working days into its execution. The overall project schedule completion stands at 0.5%, reflecting that only the initial foundation activities have been executed thus far.

#### 4. SCHEDULE AND COST ANALYSIS

##### 4.1 Introduction

This chapter presents the detailed schedule and cost analysis of the G+3 residential building project based on the progress-updated Primavera P6 schedule as of the data date of 14th April 2026. The analysis is structured in three parts: (i) schedule status analysis — examining the current state of all activities in relation to their planned and baseline dates; (ii) cost analysis — comparing the budgeted

costs of activities and WBS elements against the primary baseline to identify and quantify cost variances; and (iii) two-week look-ahead schedule — presenting the forward-looking activity plan for the immediate construction period.

All data presented in this chapter is derived from the Primavera P6 schedule and its baseline comparison output. The complete baseline schedule report, showing all 87 activities with full schedule and cost data, is provided in Annexure A. The cost overrun analysis in this chapter is performed for activities where a variance between the budgeted cost and the baseline cost has been identified. Activities showing zero variance are confirmed as on-plan and are noted but not repeated in individual cost tables.

##### 4.2 Activity Status Summary

The current status of all activities in the project as of the data date is summarised in Table 4.1:

Status Category	Description	No. of Activities	% of Total
Completed	Actual Start and Actual Finish recorded; Remaining Duration = 0	2	2.3%
In Progress	Actual Start recorded; Remaining Duration > 0	1	1.1%
Not Started	No Actual Start; Planned Start is in the future	84	96.6%
TOTAL	All activities in the project schedule	87	100%

Table 4.1: Activity Status Summary as of 14th April 2026

Act. ID	Activity Name	Planned Start	Planned Finish	% Complete	Status
A1030	Cleaning of Site	27-Mar-26 A	31-Mar-26 A	100%	Completed

A1040	Earthwork in Excavation	01-Apr-26 A	14-Apr-26 A	100%	Completed
A1050	1st Class Brick in Foundation	15-Apr-26 A	30-Apr-26	37.5%	In Progress
A1070	Dressing for PCC	27-Apr-26	30-Apr-26	0%	Not Started
A1080	Plain Cement Concrete (PCC)	01-May-26	07-May-26	0%	Not Started
A1090	Reinforcement for Footing	08-May-26	13-May-26	0%	Not Started
A1100	Shuttering for Footing	14-May-26	20-May-26	0%	Not Started
A1110	RCC Footing	21-May-26	22-May-26	0%	Not Started
A1120	Back Filling	25-May-26	02-Jun-26	0%	Not Started
A1130	Anti Termite Treating	03-Jun-26	04-Jun-26	0%	Not Started
A1140	Shuttering for Plinth Beam	12-Jun-26	17-Jun-26	0%	Not Started
A1150	Reinforcement for Plinth Beam	22-Jun-26	25-Jun-26	0%	Not Started
A1160	RCC Plinth Beam	25-Jun-26	02-Jul-26	0%	Not Started
A1170	Column Starter Marking	02-Jul-26	07-Jul-26	0%	Not Started
A1180	Column Starter Concreting	07-Jul-26	14-Jul-26	0%	Not Started

two

completed activities — Cleaning of Site (A1030) and Earthwork in Excavation (A1040) — were both completed on their planned dates, indicating that the very first phase of foundation preparation has been executed on schedule. The in-progress activity — 1st Class Brick in Foundation (A1050) — started on its planned date of 15th April 2026 but has an original duration of 8 days against a revised remaining duration of 9 days, suggesting a minor time overrun is developing at this early stage. This activity requires close monitoring as it lies on the critical path.

## 5. RESULTS AND DISCUSSION

### 5.1 Introduction

This chapter synthesises and interprets the findings of the schedule and cost analysis presented in Chapter 4. The discussion is structured to address the research objectives stated in Chapter 1: to quantify cost overrun at the project and floor levels, to identify and discuss its root causes, to compare the findings with the patterns documented in the

literature reviewed in Chapter 2, and to formulate concrete recommendations for corrective and preventive action. The chapter concludes with a comprehensive consolidated findings table and a discussion of the role that Primavera P6 played as a project management tool in this study.

### 5.2 Summary of Cost Overrun Findings

The baseline comparison conducted in Primavera P6 reveals a total project cost overrun of Rs. 7,82,238 — representing a 13.84% deviation above the primary baseline cost of Rs. 56,52,612. The current total budgeted cost of the project stands at Rs. 64,34,850. This level of overrun, while significant in absolute terms, falls within the range of 10–25% that the literature review identified as typical for residential building projects in India (Shanmugapriya and Subramanian, 2013; Memon, Rahman and Azis, 2011), suggesting that the project's cost performance is consistent with sector norms even if it is not within acceptable project management thresholds.

The key quantitative findings from the analysis are summarised below:

S.No	Finding	Value	Reference
1	Total Budgeted Cost of Project	Rs. 64,34,850	Table 4.5
2	Total Primary Baseline Cost	Rs. 56,52,612	Table 4.5
3	Total Cost Overrun (Absolute)	Rs. 7,82,238	Table 4.5

S.No	Finding	Value	Reference
4	Total Cost Overrun (Percentage)	13.84%	Table 4.5
5	WBS with Highest Overrun (Absolute)	Second Floor — Rs. 3,81,450	Table 4.5
6	WBS with Highest Overrun (Percentage)	Second Floor — 56.14%	Table 4.5
7	WBS with No Variance	Finishing Works — 0.00%	Table 4.5
8	Activity with Highest Absolute Overrun	A1480 — Rs. 3,81,450	Table 4.8
9	Activities contributing >99% of overrun	A1480, A1590, A1070 (3 activities)	Table 4.8
10	Overall Schedule % Complete (Data Date)	0.5% as of 14th April 2026	Table 4.1

Table 5.1: Consolidated Summary of Cost Overrun Findings

## 6. Conclusion

The present study investigated the analysis of cost overrun in a G+3 residential building project using Oracle Primavera P6 software. Through the development of a detailed project schedule, the formal creation and assignment of a primary baseline, the updating of construction progress to the data date of 14th April 2026, and the systematic comparison of budgeted costs against baseline costs at the activity and WBS levels, the study has achieved all seven objectives stated in Chapter 1.

In conclusion, cost overrun in residential building construction is a multi-causal phenomenon that can be effectively monitored, quantified, and managed through the disciplined application of Primavera P6. The two most important preconditions for effective cost overrun management are: (i) a comprehensively cost-loaded baseline that captures all confirmed project expenditures at the time of approval; and (ii) regular, structured progress updates that keep the schedule current and enable timely baseline comparison. Where these two conditions are met, Primavera P6 provides project managers and engineers with the quantitative tools necessary to detect cost deviations early, attribute them to specific activities, understand their causes, and implement corrective measures before overruns escalate beyond control.

The findings of this study are consistent with the patterns documented in the published literature on construction cost overrun, confirming that the G+3 residential building project exhibits causes — planning inadequacy, material price escalation, and scope reassessment — that are representative of the broader Indian residential construction sector. The study provides a documented, replicable example of how Primavera P6 can be applied to cost overrun analysis in medium-scale residential projects, contributing to the limited body of published work

in this specific area.

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