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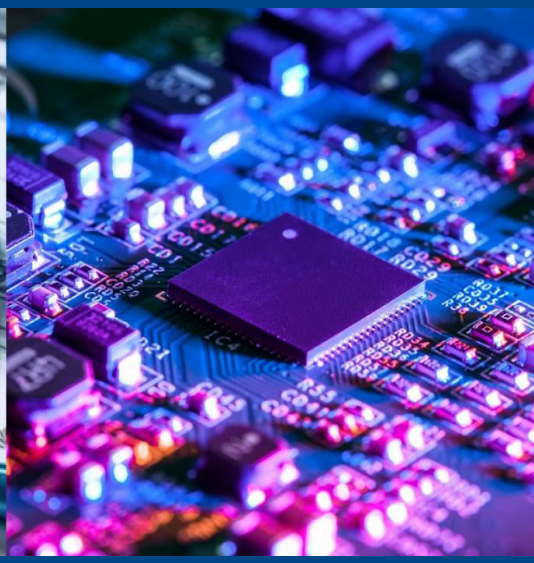

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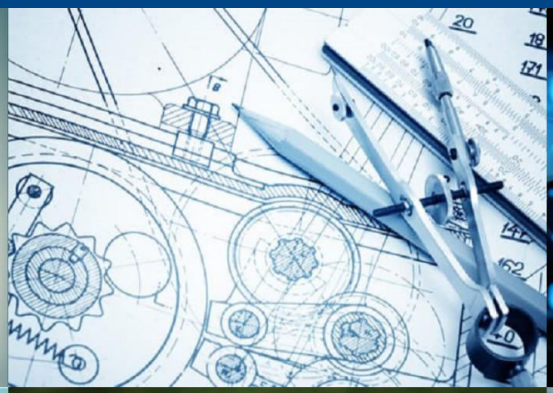

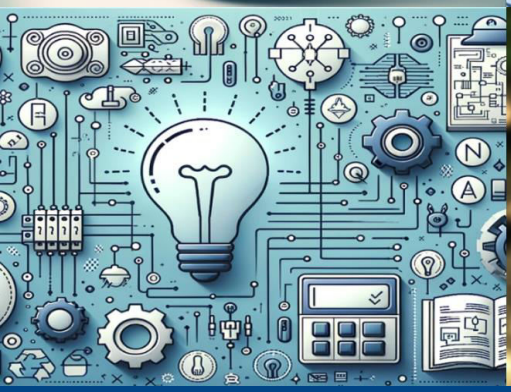

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A Review on House Construction Management Project

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ABSTRACT: This project report presents the comprehensive planning and management of a G+2 residential building named Sunrise Villa, located in Nagpur, Maharashtra. The objective of this project is to demonstrate effective construction management practices applied to a real-world housing scenario, integrating academic knowledge with practical implementation. The residential structure is designed as a G+2 RCC framed building, covering a plot area of 2,000 sq.ft and achieving a total built-up area of 4,800 sq.ft. It comprises three 2BHK units, one on each floor.

The project was scheduled for completion within 12 months and maintained a budget of ₹ 60 Lakhs.
The project encompasses detailed steps such as:

- Planning and Scheduling using modern tools (e.g., MS Project),
- Work Breakdown Structure (WBS) and Critical Path Method (CPM) for time management,
- Accurate cost estimation using Quantity Takeoff (QTO),
- Quality control through regular material testing and site inspections,
- Risk mitigation strategies for challenges like labor shortages and weather disruptions,
- Implementation of sustainability measures including rainwater harvesting, use of fly ash bricks, and local materials.

The successful delivery of the project within the planned time and budget illustrates the practical application of construction management principles. The study also aligns with IS codes (IS 456, IS 875) and the National Building Code 2016 to ensure safety, durability, and compliance.

I. INTRODUCTION

BACKGROUND AND CONTEXT

Urban regions like Nagpur, Maharashtra, are witnessing a growing demand for quality residential infrastructure driven by population growth, urbanization, and changing lifestyles. To meet this demand, housing projects must be delivered efficiently, safely, sustainably, and within budgetary and time constraints. This requires a systematic and multidisciplinary approach to Construction Project Management (CPM), which integrates planning, execution, control, and continuous monitoring throughout the project lifecycle.

NEED FOR EFFECTIVE CONSTRUCTION MANAGEMENT

Construction projects are inherently complex due to their scale, the involvement of diverse stakeholders, fluctuating market conditions, and site-level uncertainties.

Inefficiencies in project management can lead to cost overruns, delays, quality defects, and safety risks. To avoid these pitfalls, globally accepted frameworks and techniques have been developed, which this project seeks to apply and demonstrate in a local Indian context.

As noted by Kerzner (2017) and the PMI (2017) in the PMBOK Guide, project success depends on structured planning, scheduling, risk management, and control systems. Chitkara (2011) further emphasizes the importance of WBS and CPM in managing time and resource flow, which were used in Sunrise Villa to develop and monitor the construction sequence.

OBJECTIVES OF THE PROJECT

The primary objectives of this project are:

- To integrate theoretical construction management principles with real-world project execution.

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- To plan and execute a G+2 residential building using structured project management tools like WBS, CPM, and MS Project.
- To maintain budgetary control and resource efficiency through accurate quantity estimation (QTO) and cost forecasting.

KEY DOMAINS OF MANAGEMENT

1.1 PROJECT PLANNING AND SCHEDULING

Planning and scheduling form the backbone of any construction activity. The use of WBS and CPM methods ensured that critical activities in Sunrise Villa were prioritized and monitored. As per Gould & Joyce (2013), well-defined schedules prevent worksite clashes and material downtime. The study by Assaf & Al-Hejji (2006) also reinforces how improper planning is a common cause of delays in residential projects.

1.2 COST MANAGEMENT

Cost control was maintained through detailed QTO and tracking against budgeted values. Brook (2016) and Ashworth & Perera (2018) stress that tender accuracy and life-cycle costing are vital for financial sustainability. In volatile market conditions, strategies from Aibinu & Jagboro (2002) and Enshassi et al. (2013)—like early procurement and labor planning—helped reduce the impact of inflation and delays.

1.3 QUALITY MANAGEMENT

Construction quality was ensured by regular site supervision, material testing, and process reviews. Studies such as Jha & Iyer (2006) highlight how managerial commitment, communication, and technical capability directly influence project quality. Love & Li (2000) warn against the high cost of rework due to poor initial quality controls, a risk mitigated in this proje1ct through early interventions.

1.4 MANAGEMENT

Worksite safety was addressed through risk assessments, PPE enforcement, and daily safety briefings. Theories by Hinze (1997) and Toole (2002) underline how clearly assigned safety roles and regular training reduce accidents. This approach was further reinforced by Lingard & Rowlinson (2005), who advocate for worker welfare and compliance with safety codes.

II. LITERATURE REVIEW

INTRODUCTION

Effective construction management plays a vital role in the successful completion of housing projects, especially in urbanizing regions like India. The literature reviewed in this chapter explores the major domains relevant to house construction management—planning and scheduling, cost control, quality assurance, safety, and sustainable construction. The goal is to bridge academic knowledge with practical applications in real-world construction projects.

1. Nimbal and Jamadar (2017) :-

highlighted the importance of using software like Primavera P6 for project planning and resource allocation. Their study on a G+8 apartment building showed that proper use of planning tools improves coordination, monitors progress effectively, and minimizes delays. This supports the application of MS Project and Work Breakdown Structure (WBS) used in the Sunrise Villa project.

Additionally, the concept of Schedule Network Analysis, as discussed in a guide from Acq Notes, aids in identifying critical paths and estimating project durations using tools like Gantt and PERT charts.

2. Kerzner, H. (2017):-

Project Management: A Systems Approach to Planning, Scheduling, and Controlling. Sunrise Villa G+2 Residential Building Kerzner's work emphasizes a systems-oriented approach to project management, offering structured methodologies for integrating planning, cost, quality, and risk control. His principles directly support the management of residential projects like Sunrise Villa, where coordination across multiple tasks and resources is crucial.

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3. PMI (2017):-
The PMBOK Guide is a globally recognized standard that defines best practices and structured approaches across ive process groups: Initiating, Planning, Executing, Monitoring & Controlling, and Closing. Your Sunrise Villa project reflects the application of these principles in a real-world residential construction scenario.
The project's structured coordination across planning, cost, scheduling, and sustainability reflects PMBOK's emphasis on integrated management.

4. Chitkara, K. K. (2011):-
Chitkara's book provides a detailed, India-focused perspective on the systematic planning, scheduling, and control of construction projects. His methodologies are particularly suitable for mid-scale residential projects like Sunrise Villa, located in Nagpur. Chitkara emphasizes the use of WBS to break down activities for better planning and execution—a technique you've applied to segment construction stages floor-wise and component-wise.

5. Gould, F., & Joyce, N. (2013)
Gould and Joyce provide a practical view of managing construction projects by emphasizing coordination, communication, and control from pre-construction to closeout. Their work supports the structured execution of projects like Sunrise Villa by focusing on collaboration and clear role definitions.
- Field Operations and Monitoring: Their stress on daily site reports and inspections complements your site inspection and material quality monitoring practices.

6. Jha, K. N., & Iyer, K. C. (2006):-
Critical factors affecting quality performance in construction projects. Construction Management and Economics.
This empirical study investigates the major factors affecting quality in Indian construction projects. It identifies top influences including top management support, coordination, site conditions, and contractor capabilities—all directly relevant to residential buildings like Sunrise Villa.

7. Brook, M. (2016)
Estimating and Tendering for Construction Work. Routledge.
Brook provides practical insights into cost estimation, tender preparation, and bid analysis. The methods discussed are essential for housing projects like Sunrise Villa, where budget constraints and competitive tendering play a critical role.

8. Ashworth, A., & Perera, S. (2018)
Ashworth, A., & Perera, S. (2018). Cost Studies of Buildings. Routledge.
This book explores construction costs in detail, including design, specification, and operational decisions that affect cost over the project lifecycle. For a residential project like Sunrise Villa, such factors are crucial in maintaining cost efficiency without compromising functionality.

9. Elinwa, A. U., & Buba, S. A. (1993)
Construction cost factors in Nigeria. Journal of Construction Engineering and Management. This study identifies significant cost-influencing factors in construction, including material availability, labor cost, and project location. While based in Nigeria, its findings are applicable to Indian contexts where similar challenges affect budget planning.

10. Aibinu, A. A., & Jagboro, G. O. (2002)
Time–cost performance of building construction projects in Nigeria. Journal of Construction Research.
This research investigates the correlation between time delays and cost overruns. Its relevance is high in managing housing projects like Sunrise Villa, where staying within both time and budget is essential.
Aibinu and Jagboro's analysis reinforces the importance of time-cost integration in residential construction, helping to improve cost predictability and delivery success.

11. Enshassi, A., Mohamed, S., & Abdel-Hadi, M. (2013) Factors affecting the cost performance of construction projects. International Journal of Project Management.
This paper analyzes key internal and external factors influencing construction costs, including project size, type, market conditions, and management effectiveness.

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Enshassi et al. provide a well-rounded framework for understanding cost performance drivers, reinforcing the strategies used to deliver Sunrise Villa on budget.

12. Rezaian (2011)
proposed a survival pyramid model focusing on the interdependence between time, cost, quality, and risk. He stressed that trade-offs must be optimized to meet client expectations and ensure project success. This aligns with the Sunrise Villa project's goals of maintaining a 12- month schedule and ₹60 Lakh budget without compromising structural integrity or sustainability.

13.Jha, K. N., & Iyer, K. C. (2006)
Critical factors affecting quality performance in construction projects. Construction Management and Economics.
The study emphasizes skilled workforce and material quality, both of which were prioritized in your project through inspection and procurement policies.

Love, P. E., & Li, H. (2000)
Quantifying the causes and costs of rework in construction. Construction Management and Economics.
The study quantifies the financial and schedule impact of rework due to construction errors, miscommunication, and design changes. It emphasizes proactive quality control to minimize such losses.
- Cost of Quality: By minimizing rework, your project controlled hidden costs, aligning with the study's findings on improving project outcomes.

14.Arditi, D., & Gunaydin, H. M. (1997)
Total quality management in the construction process. International Journal of Project Management.
This study promotes Total Quality Management (TQM) in construction, focusing on continuous improvement, teamwork, and customer satisfaction. TQM strategies help reduce errors and improve construction efficiency.
Team Involvement: Regular feedback from site engineers and labor teams supported consistent construction quality.

15.Pheng, L. S., & Teo, J. A. (2004)
This paper focuses on challenges and benefits of implementing TQM systems in construction firms, with emphasis on cultural readiness, staff involvement, and structured quality programs.
Worker Involvement: The team was involved in achieving benchmarks for materials and workmanship.
Process Control: The structured planning and task sequencing reflect TQM's principle of process standardization.

16.Low, S. P., & Teo, J. A. (2004)
Implementing ISO 9000 quality management systems in construction firms. Journal of Construction Engineering and Management.
Quality Standards: Sunrise Villa followed IS 456 and IS 875, reflecting the adoption of structured quality standards.
The project applied ongoing inspection methods, supporting ISO-based quality tracking.

17.Jha, K. N., & Iyer, K. C. (2006)
Factors affecting quality performance in construction projects. Construction Management and Economics.
This study identifies essential factors influencing quality in Indian construction projects. The findings highlight the role of top management, organizational commitment, and site coordination in ensuring quality performance.
Coordination: Effective coordination among contractors, suppliers, and workers ensured fewer execution errors and timely quality checks.

18.Hinze, J. (1997)
Construction Safety. Prentice Hall.
Hinze presents practical approaches to improving safety on construction sites through planning, hazard identification, and behavior-based safety programs.
Safety Planning: At Sunrise Villa, preliminary hazard assessments were carried out during the planning phase, aligning with Hinze's emphasis on proactive safety.
Training and PPE: The workforce was trained in PPE usage and site safety protocols.

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19. Toole, T. M. (2002)
Construction site safety roles. Journal of Construction Engineering and Management.
Toole emphasizes that project safety depends heavily on the role of site managers, design professionals, and workers. Clear role assignment enhances accountability and performance.
Defined Roles: The Sunrise Villa site team had designated safety officers responsible for enforcing daily safety checks.
Toole's study reinforces the importance of clearly defined safety responsibilities, a practice evident in the Sunrise Villa construction process.

20. Lingard, H., & Rowlinson, S. (2005)
Health and Safety in Construction Project Management. Spon Press.
Compliance: Local labor laws and IS codes guided safety practices.
Well-being: Shade areas and hydration facilities were provided, addressing worker welfare. The approach at Sunrise Villa reflects Lingard and Rowlinson's model of integrated safety management focused on compliance and worker welfare.

21. Choudhry, R. M., et al. (2008)
Management in construction: Best practices. Journal of Professional Issues in Engineering Education and Practice.
This study presents safety best practices such as regular safety audits, safety culture promotion, and the use of risk mitigation tools.
Safety Culture: The project promoted a zero-accident policy through awareness boards and supervisor-led checks.
Tools and Training: Workers received basic hazard training aligned with the study's recommendations.

22. Gambatese, J. A. (2003)
Safety in design and construction. Journal of Construction Engineering and Management. Gambatese advocates for integrating safety principles during the design phase to reduce hazards during construction and operation.
Maintenance Access: Safety during future building use (e.g., water tank access) was addressed at the design level.
Preventive Engineering: Simple layout decisions helped reduce the likelihood of falls and injury.

23. Kibert, C. J. (2016)
Sustainable Construction: Green Building Design and Delivery. Wiley.
Kibert's book presents a comprehensive framework for sustainable construction, focusing on energy efficiency, resource conservation, and environmentally responsible design.
Sustainable Materials: Use of fly ash bricks and locally sourced materials in Sunrise Villa aligns with Kibert's recommendations.

24. Tam, V. W., et al. (2007)
Green construction assessment using cost and time criteria. Building and Environment.
This study evaluates green building practices using cost-effectiveness and scheduling impacts, highlighting the balance between sustainability and project efficiency.
Cost-Time Balance: Sustainable features like fly ash bricks were selected for their dual benefit of affordability and time-saving installation.
Assessment Tools: The decision-making framework from this study helps validate your choices of eco-friendly technologies without compromising budget or schedule.

25. Zuo, J., & Zhao, Z. Y. (2014)
Green building research – current status and future agenda. Renewable and Sustainable Energy Reviews.
Zuo and Zhao provide a review of global green building research trends, focusing on policy gaps, awareness, and market incentives for adopting sustainable design.
Regional Application: While the study is global, it identifies challenges relevant to Indian projects like cost barriers and limited regulatory enforcement.
Future Research: The project contributes to local knowledge by showcasing real-world green applications.
The research supports the importance of showcasing projects like Sunrise Villa as models for sustainable construction in developing regions.

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26. Darko, A., & Chan, A. P. C. (2016)
Review of green building research trends. Habitat International.
Darko and Chan's review identifies drivers, barriers, and best practices in green building adoption across different economies.
Drivers: The use of low-cost sustainable materials and efficient design in Sunrise Villa reflects key green building drivers such as affordability and availability.
Barriers: The study highlights cost perception and lack of expertise as barriers that the project overcame through careful planning and academic support.
Best Practices: The project followed recommended practices including site waste reduction and passive design.

27. Azhar, S., Carlton, W. A., Olsen, D., & Ahmad, I. (2011)
Building information modeling for sustainable design. Automation in Construction.
This paper highlights how Building Information Modeling (BIM) enhances sustainable design by improving visualization, clash detection, and energy simulation.
Design Clarity: Though BIM was not fully implemented, the project benefited from 3D visualization and clash avoidance during planning.

28. Lou Yongli (2016)
Lou Yongli (2016) investigated bidding strategies and evaluation methods in construction, identifying comprehensive scoring and lowest evaluated bid as key approaches. These insights are valuable for understanding procurement decision-making in residential construction projects.

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