WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Analyses of a Building Construction BG+4

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DOI: https://doi.org/10.55248/gengpi.5.0524.1216

A B S T R A C T

This research paper presents a comprehensive analysis of building construction, focusing on key aspects such as structural design, materials selection, cost estimation, safety considerations, and environmental impact. The study specifically examines a BG+4 (Basement + Ground + 4 Floors) building construction project to illustrate the application of the analysis methodology.

Materials analysis assesses the properties and characteristics of construction materials, including concrete, steel, masonry, and glass, to ensure durability, strength, and cost-effectiveness.

Cost estimation involves a detailed breakdown of project expenses, covering materials, labor, equipment, and other associated costs, to provide insights into budget management and resource allocation. Safety considerations identify potential hazards and risks during the construction process and recommend safety measures and protocols to ensure the well-being of workers and site occupants.

Keywords: BG+4, CAD, BIM, Autocad, Stadpro, etabs software

1. Introduction

Building construction is a fundamental aspect of human civilization, shaping our environments and providing spaces for living, working, and recreation. As populations grow and urbanization accelerates, the demand for new buildings and infrastructure continues to rise, making the analysis of building construction more critical than ever before.

This research paper presents an in-depth analysis of building construction, encompassing various facets including structural design, materials selection, cost estimation, safety considerations, and environmental impact

In this paper, we will focus on the analysis of a BG+4 (Basement + Ground + 4 Floors) building construction project as a case study to illustrate the application of our methodology. This building typology is chosen for its prevalence in urban areas and its representation of medium-scale construction projects. By examining a specific project, we aim to provide practical insights that can be extrapolated to a broader context.

The significance of this analysis extends beyond the confines of individual projects. It contributes to the body of knowledge in building construction, informing best practices, innovation, and continuous improvement in the industry.

Through this research paper, we hope to shed light on the multifaceted nature of building construction and inspire dialogue and collaboration among stakeholders to address the complex challenges facing the construction industry. Ultimately, our goal is to promote excellence in building construction practices, driving positive change and contributing to the creation of built environments that enhance the quality of life for all.

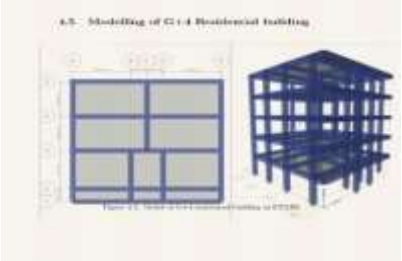


Fig. 1 Modelling of G+4 residential Building

2. Literature Review

1. A literature review on the analysis of building construction would typically encompass various aspects related to the structural integrity, materials used, construction techniques, sustainability factors, and safety considerations. Here's a broad outline of what such a review might cover:

2. Structural Analysis Methods: Review different methods used for analyzing the structural stability and load-bearing capacity of buildings, including finite element analysis (FEA), structural dynamics analysis, and computational fluid dynamics (CFD).

3. Materials Selection and Analysis: Explore the different types of materials commonly used in building construction, such as concrete, steel, wood, and composite materials. Evaluate their properties, including strength, durability, and environmental impact, as well as methods for analyzing their performance under various conditions.

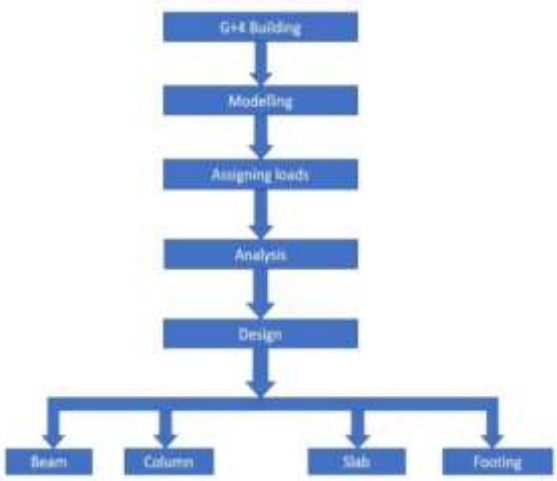
4. Construction Techniques: Discuss traditional and modern construction techniques, such as reinforced concrete construction, steel frame construction, and prefabrication methods. Analyze the advantages and limitations of each technique and their impact on building performance.

5. Sustainability in Construction: Examine the growing importance of sustainability in building construction, including green building materials, energy-efficient design strategies, and renewable energy integration. Review methods for analyzing the environmental impact of construction activities and assessing the overall sustainability of buildings.

6. Safety and Risk Analysis: Investigate safety considerations in building construction, including structural safety, fire safety, and seismic risk analysis. Review methods for assessing and mitigating risks associated with construction processes and building occupancy.

7. Case Studies and Best Practices: Analyze case studies of specific building projects to illustrate the application of various analysis techniques and construction methods. Identify best practices and lessons learned from successful construction projects and discuss opportunities for improvement. .[1] [5]

3. Research Methodology



Research Objectives:

Clearly define the objectives of the study, such as evaluating the structural integrity of a specific building type, assessing the environmental impact of construction materials, or identifying best practices for improving construction safety.

Literature Review:

Conduct a comprehensive literature review to identify existing research and knowledge gaps related to the chosen research objectives. Review studies on structural analysis methods, materials selection, construction techniques, sustainability factors, safety considerations, and relevant case studies. .[2]

Research Design:

Determine the appropriate research design based on the objectives of the study. Consider whether the research will be qualitative, quantitative, or a combination of both. Determine the scope of the study, the target population (e.g., specific types of buildings or construction projects), and any constraints or limitations. [3] .[4] .[6]

DETAILING OF FOOTING DESIGN	
Column size	350mm x 450mm
Lenth of the footing	5.45m
Width of the footing	5.45m
Depth of the footing	0.711m
Area of steel for bottom reinforcement(Mx)	9481.380mm²
Area of steel for bottom reinforcement(Mz)	9126.334mm²
Area of steel for top reinforcement(Mx)	4649.940mm²
Area of steel for top reinforcement(Mz)	5180.433mm²
Bottom reinforcement(Mx)	12mm dia bars atm65mm c/c
Bottom reinforcement(Mz)	12mm dia bars at 60mm c/c
Top reinforcement(Mx)	8mm dia bars at 50mm c/c
Top reinforcement(Mz)	8mm dia bars at 55mm c/c

Fig. 4- RCC and Steel construction

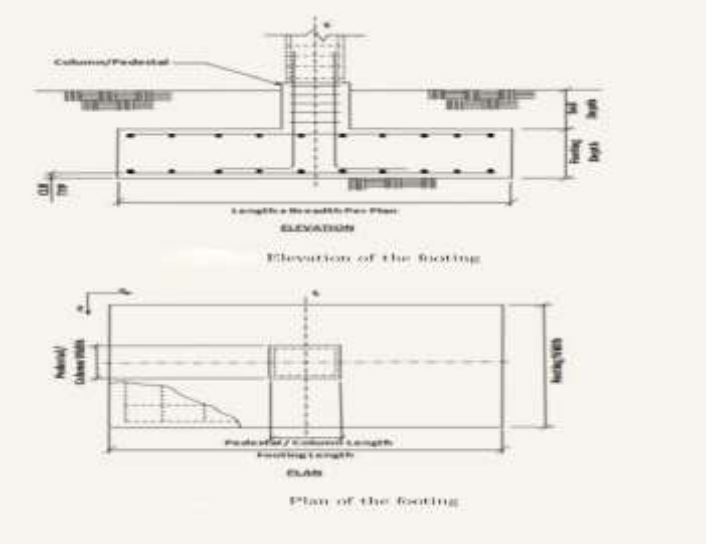


Fig. 2 - Elevation and Plan of Footing

Fig - 05 Data Collection from Site: BG+4 Aiyar Building Construction

4. Data Collection

Table-2 Shows Data Collection from Site: BG+4 Aiyar Building Construction

Aspect	Description
Site Layout	- Overview of the construction site layout
	- Location near subhash nagar metro station.
Building Characteristics	- Obtain architectural drawings, plans, and specifications.
	- Including floor plans, elevations, sections, and details.
	- Dimensions, footprint, total floor area, and number of floors.
Materials Used	- Concrete grades, reinforcement types, steel sections, masonry units, and finishes.
	- Quantities of concrete, steel, bricks, etc.
	- Prefabrication, modular construction, or green building practices.
Workforce Management	- Number of workers involved in construction.
	- Roles and responsibilities of workers.
	- Work shifts and schedules.
Safety Measures	- Safety protocols and procedures implemented.
	- Including fire detection, alarm, suppression, and emergency evacuation procedures.
	- Compliance with local building codes, regulations, and safety standards.
Stakeholder Engagement	- Clients/owners.
	- Architects and designers.
	- Contractors and subcontractors.
Environmental Impact	- Sustainable Practices and Mitigation Strategies.
	- Material Extraction .
	- Energy and Water Use.
Challenges and Solutions	- Challenges encountered during construction
	- Solutions or strategies implemented to address challenges.
	- Lessons learned and improvements made

5. Results & Conclusion

Table 2- the key findings across different aspects of the construction project at the Aiyer Construction Building site in Nagpur

Aspect	Description
Construction Activities	- Stimulate economic growth by creating jobs.
	- Generating income for workers and businesses, and attracting investment to the local economy.
	- Sustainable construction practices employed in G+4 buildings.
Materials Used	- High-quality construction materials, such as reinforced concrete, structural steel, and engineered wood products.
	- Incorporating sustainable building materials.

	- Incorporating eco-friendly smaterials.
Workforce Management	- Timely Project Delivery.
	- Efficient Conflict Resolution.
Safety Measures	- Safety Leadership and Accountability.
	- Emergency Preparedness.
	- Material Handling and Storage.
Stakeholder Engagement	- Improved Project Understanding .
	- Enhanced Decision-Making.
Environmental Impact	- Resource Efficiency.
	- Water Conservation.
Challenges and Solutions	- Innovative Solutions.
	- Quality Improvement.

This tabular format succinctly presents the key findings across different aspects of the construction project at the Aiyer Construction Building site in Nagpur. It allows for a quick overview of the results and facilitates easy comparison between different elements of the construction process.

[7][8][6]

6. Conclusion:

Design Considerations:

The design phase of building construction plays a crucial role in determining the structural integrity,functionality, and aesthetic appeal of the building. Factors such as site conditions, building codes, environmental considerations, and user requirements must be carefully evaluated and integrated into the design process to achieve successful outcomes. [10]

Material Selection:

The choice of construction materials significantly impacts the performance, sustainability, and environmental footprint of the building. By selecting appropriate materials based on factors such as durability, energy efficiency, and environmental impact, construction professionals can enhance the quality and longevity of the built environment while minimizing resource consumption and waste generation. [11][2]

Construction Methods and Techniques:

The adoption of advanced construction methods, technologies, and techniques can improve efficiency, productivity, and safety in building construction. Prefabrication, modular construction, Building Information Modeling (BIM), and robotics are examples of innovative approaches that have the potential to transform the construction industry and address key challenges such as labor shortages and project delays. .[12][4]

Project Management and Stakeholder Engagement:

Effective project management practices, including scheduling, budgeting, risk management, and stakeholder engagement, are essential for ensuring the successful execution of building construction projects. By fostering collaboration, communication, and accountability among project stakeholders, construction teams can overcome challenges, mitigate risks, and deliver projects on time and within budget. [9][6]

Sustainability and Environmental Impact:

Building construction has significant environmental implications, including resource depletion, energy consumption, and greenhouse gas emissions. Sustainable construction practices, such as green building certification, energy-efficient design, and waste reduction strategies, are critical for minimizing environmental impact and promoting long-term sustainability in the built environment.

Future scope :

The future scope of analysis in building construction looks promising with advancements in materials, technology, and sustainability. Predictive analytics, AI-driven design optimization, and IoT for real-time monitoring will likely play significant roles. Additionally, there'll be a greater emphasis on green building practices and resilience to climate change. Robotics and 3D printing could revolutionize construction processes, making them faster, safer, and more cost-effective. Overall, expect a shift towards smarter, more efficient, and environmentally conscious construction practices. [13][6]

References

C. S. Bhashakhetre, A. N. Chalkhure, S. R. Marve, and N. T. Wadhai, "Plastic Waste Prevention System Analysis & Application," Int. J. Innov. Res. Sci. Eng. Technol., vol. 6, no. 7, pp. 12625–12631, 2017, doi: 10.15680/IJIRSET.2017.0607023.

S. R. Marve, S. R. Shende, and A. N. Chalkhure, "Public Transportation System in Chandrapur City," Int. J. Sci. Res. Sci. Eng. Technol., vol. 4, no. 10, pp. 306–312, 2018, doi: 10.32628/18410IJSRSET.

R. Giri, A. Khan, S. R. Shende, S. A. Khanke, and R. Shradhesh, "A Review on Analysis and Design of Multistorey Hospital Building (G + 4) International Journal of Research Publication and Reviews A Review on Analysis and Design of Multistorey Hospital Building," no. March, 2023, doi: 10.55248/gengpi.2023.4.34359.

S. R. Tajne , Gayatri; Shende, Shreyas ;Marve, "A Review on Manufacturing Process and Techniques of Hume Concrete," Int. J. Res. Publ. Rev., vol. 04, no. 01, pp. 1806–1812, 2022, doi: 10.55248/gengpi.2023.4149.

S. R. Marve and M. P. Bhorkar, "Analysis of Traffic Congestion of Hingna Region in Nagpur City," Int. Res. J. Eng. Technol., vol. 03, no. 04, pp. 2593–2598, 2016, [Online]. Available: https://www.irjet.net/archives/V3/i4/IRJET-V3I4514.pdf

S. R. Marve and M. P. Bhorkar, "Traffic Congestion Study for a Developing Area of Nagpur City," pp. 1–4.

S. M. Barde et al., "A Review of Parking Management System at SSCET Campus," Int. J. Res. Publ. Rev., vol. 3, no. 7, pp. 2996–2999, 2022, [Online]. Available: https://doi.org/10.55248/gengpi.2022.3.7.15

A. N. Chalkhure, S. R. Marve, M. S. Wankar, and A. N. Bhendale, "Design of Harvestine Filter Unit," vol. 9, no. July, pp. 2227–2235, 2020.

S. R. Shende, S. R. Pathan, S F, Marve, A. G. Jumnake, and ..., "A Review on Design of Public Transportation System in Chandrapur City," J. Res., vol. 04, no. 01, pp. 41–47, 2018, [Online]. Available: http://www.journal4research.org/articles/J4RV4I1007.pdf

S. R. S Jumde, Marve, A. Chalkhure, R. Murlidhar Khobragade, A. Gurudas Chunarkar, S. Maroti Thakre, and A. Professor, "Design & Analysis of Multi-Storied Car Parking Building (G+2)," Int. J. Innov. Res. Sci. Eng. Technol., vol. 9, no. 4, pp. 1988–1996, 2020, [Online]. Available: http://www.ijirset.com/upload/2020/april/132_Design.PDF

C. S. Bhashakhetre and S. R. Marve, "A Study of Vibrating Foundation 1," vol. 7, no. 2, pp. 803–816, 2020.

S. R. Marve and M. B. P. Baitule, "Traffic Congestion Minimization Study for Hingna Area of Nagpur City , MS . India," Int. J. Eng. Res. Technol. ISSN, vol. 4, no. 30, pp. 1–4, 2016, [Online]. Available: https://www.ijert.org/research/traffic-congestion-minimization-study-for-hingna-area-of-nagpur-city-ms.-india-IJERTCONV4IS30024.pdf

C. S. Bhashakhetre, A. N. Chalkhure, S. R. Marve, and N. T. Wadhai, "Partial Replacement of Course and Fine Aggregate By Plastic Waste and Bed Ash," Int. Res. J. Eng. Technol., vol. 4, no. 6, pp. 914–918, 2017, [Online]. Available: https://irjet.net/archives/V4/i6/IRJET-V4I6171.pdf