

Quality Management Strategies in the Construction Phase of Housing Projects

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Abstract: This article focuses on quality management during the construction phase of housing projects. It elaborates on its importance, analyzes factors affecting quality, and discusses in detail quality management strategies from the construction preparation stage to the completion acceptance stage. These strategies include the establishment of a quality management system, personnel management, material management, and specific quality control measures for each stage. Through practical case analysis, it demonstrates the application effects of effective quality management strategies and proposes suggestions for improving the quality management level during the construction phase of housing projects, aiming to provide reference for enhancing the quality of housing projects.

1. Introduction

Housing projects are critical infrastructure for social development, and their quality is directly linked to people's life and property safety as well as their quality of life. The construction phase is the key stage of housing projects. Enhancing quality control during this phase is of great significance for ensuring project quality, reducing project costs, and improving the economic and social benefits of enterprises. In actual construction practice, quality problems in housing projects occur from time to time due to various influencing factors, generating certain negative impacts. Therefore, in-depth exploration of quality management strategies for the construction phase of housing projects has important practical significance.

2. The Importance of Quality Management in the Construction Phase of Housing Projects

2.1 Ensuring Life and Property Safety

Housing projects, as the primary spaces for people's living and daily work, have a quality directly related to their life and property safety. During the construction phase, starting from the foundation works, strictly controlling key indicators such as the bearing capacity of piles and the strength of concrete effectively ensures the safety and stability of the building structure, enabling it to withstand natural disasters such as earthquakes and strong winds. During the main structure construction phase, strict control over the specifications and standards, quantities, and tying methods of reinforcement bars, as well as concrete pouring and curing processes, prevents issues such as structural cracks and insufficient strength, avoiding major accidents like collapses during the building's usage phase^[1].

2.2 Improving Functional Performance

The functional performance of housing projects is the basis for meeting people's living and working needs. Quality supervision and management during the construction phase are decisive for realizing the building's intended functions. From the perspective of interior decoration, reasonable material selection and precise construction techniques can ensure wall flatness, floor wear resistance, and door/window sealing, creating a comfortable and aesthetically pleasing living and working space for people^[2]. During the installation of equipment such as plumbing, electrical, and HVAC (Heating, Ventilation, and Air Conditioning), rigorous quality management ensures the normal operation of equipment, preventing problems like water leakage, electrical leakage, and poor ventilation, thereby improving the convenience and comfort level of building use.

2.3 Promoting Sustainable Development of Enterprises

For construction enterprises, quality control during the construction phase is a core element of sustainable development. High-quality projects can establish a good brand image for the enterprise, gain the trust of owners and market acclaim. In the highly competitive construction market, a good reputation is an important support for enterprises to obtain more project opportunities. If construction quality problems occur, it will not only cause rework and increase costs but also damage the enterprise's reputation, putting it at a disadvantage in market competition.

2.4 Promoting Socio-Economic Development

As an important component of the socio-economic sphere, strengthening quality management during the construction phase of housing projects is of significant importance for promoting socio-economic development. High-quality housing projects can improve the utilization efficiency of land resources and promote urban construction and development^[3]. High-quality buildings can reduce expenditures for later maintenance and renovation, minimizing the unnecessary consumption of social resources. The construction process of housing projects itself can drive the development of related industries, such as building materials, mechanical equipment, and labor services, creating a large number of employment opportunities for society and boosting economic growth.

3. Factors Affecting Quality in the Construction Phase of Housing Projects

3.1 Human Factors

Personnel are the core subjects of housing project construction. The quality and skill level of relevant personnel play a decisive role in project quality. From management levels to frontline operators, all can influence project quality. Management personnel (project managers, technical leaders, etc.) should possess sufficient project management experience and professional knowledge, enabling them to formulate scientific and reasonable construction plans and management methods^[4]. If management personnel make wrong decisions or have management issues, it may lead to chaotic construction progress and reduced quality standards. The skill level and sense of responsibility of frontline operators are also extremely crucial. The technical level of masons directly affects the flatness and verticality of walls; whether reinforcement bar workers operate according to regulations affects the tying quality and structural safety. The safety and quality awareness of operators also impact project quality. If operators do not follow safety operating procedures, it may cause safety accidents, thereby affecting project progress and quality.

3.2 Material Factors

Materials are the physical foundation that constitutes the entity of housing projects. The quality of the project is directly affected by material quality. In conventional housing projects, if indicators such as the strength grade and stability of cement do not meet relevant requirements, it will cause the concrete strength to fail to meet requirements, affecting the structure's load-bearing capacity; if the mechanical properties of steel fall below the passing line, the structure may experience brittle fracture under stress, endangering the building's safety; if the mud content and gradation of sand and gravel are unreasonable, it will affect the compactness and durability of concrete. Links such as procurement, transportation, and storage also affect material quality. Whether procuring counterfeit and shoddy materials, materials being damaged during transportation, or materials deteriorating during storage, all can significantly impact project quality.

3.3 Mechanical Factors

Mechanical equipment is the practical tool for housing project construction. Its performance and condition significantly affect project quality. Different types of housing projects require different mechanical equipment. Various performance parameters of mechanical equipment such as tower cranes, concrete mixers, and reinforcement processing equipment (e.g., lifting capacity and height of cranes, mixing capacity and duration of mixers) must meet construction requirements. Otherwise,

it will reduce construction efficiency or even make it impossible to complete set construction tasks^[5]. The maintenance of mechanical equipment is also very crucial. Regular maintenance ensures normal equipment operation and reduces the probability of failures. If mechanical equipment operates with faults for a long time, it will not only affect construction quality but may also induce safety accidents.

3.4 Environmental Factors

The impact of environmental factors on the housing project construction process should not be ignored either. Environmental factors mainly consist of natural and social environments: In the natural environment category, factors such as temperature, humidity, wind, rain, and lightning can affect construction execution and project quality. For example, pouring concrete in high-temperature weather can easily cause rapid evaporation of water from the concrete. In the social environment category, factors such as the surrounding environment of the construction site and traffic can affect construction progress. For instance, if there are residential areas near the construction site, pollution such as noise and dust generated during construction may cause resident dissatisfaction, thereby hindering normal construction progress.

4. Quality Management Strategies for the Construction Phase of Housing Projects

4.1 Quality Management in the Construction Preparation Stage

The construction unit must establish a quality management system, define the relevant responsibilities of various departments, and set quality management objectives and plans to ensure quality management work has regulations to follow. Strengthen the supervision and assessment of the operation of the quality management system to ensure its effective implementation.

Managers should possess sufficient quality management experience, strong organizational coordination skills, and a sense of responsibility; technical personnel should be familiar with professional technical knowledge and normative standards; construction personnel should undergo strict screening and professional skills training, master construction techniques and operating procedures, and ensure they possess corresponding qualifications and capabilities; strictly control material procurement, select reputable and quality-compliant suppliers, and conduct strict inspection and testing of incoming materials to ensure their quality meets requirements. Resolutely remove and return materials that do not meet specifications. Simultaneously, properly store and preserve materials to prevent deterioration and damage; according to construction requirements, reasonably select and configure construction machinery, debug and inspect machinery upon arrival at the site to ensure good performance and normal operation^[6]. During the usage phase, maintain and service machinery regularly to ensure it remains in good working condition; assign professionals to conduct joint reviews of construction drawings to ensure the design is reasonable and implementable; based on project characteristics and actual conditions, formulate reasonable and scientific construction plans and technical measures, write special construction schemes for key processes and special links, and promptly ensure construction personnel understand the construction key points and quality requirements; investigate and analyze the natural and social environment of the construction site, formulate corresponding environmental management measures. For example, install enclosures around the construction site to reduce the impact of construction on the surrounding environment; implement effective heatstroke prevention measures during construction in high-temperature seasons; complete drainage and moisture prevention work before construction in the rainy season.

4.2 Quality Management During the Construction Process

The construction process is the basic unit constituting construction quality. Focusing on strengthening process quality control is key to ensuring project quality. Before the implementation of each process, inspect the construction conditions to ensure they meet specific requirements; during construction work, strictly follow construction techniques and operating procedures, enhance

self-inspection, mutual inspection, and special inspection for quality, and promptly discover and correct quality problems^[7]. After each process is completed, it must pass inspection before the next process can begin. The quality of key parts and concealed works directly affects the quality of the entire project. For key parts such as foundations and the main structure, develop specialized quality control measures and enhance supervision and inspection during the construction process. Concealed works must be accepted before they can be concealed. During acceptance, fill out concealed works acceptance records to ensure the quality of concealed works can be traced. If quality problems occur during the construction phase, quickly analyze the problem. For general quality problems, the construction unit can handle them itself. If there are serious quality problems, convene experts for demonstration, draft treatment plans, strictly implement the plans, and conduct acceptance matters to ensure quality problems are thoroughly resolved.

4.3 Quality Management in the Completion Acceptance Stage

Completion data is key evidence reflecting project quality. The construction unit must organize and archive various data from the construction phase according to established regulations and requirements. Completion data should be authentic, accurate, and complete, including construction drawings, construction records, inspection reports, acceptance documents, etc. Completion acceptance is the final process in housing project construction. Organized by the construction unit (owner) with the participation of design, construction, and supervision units, the construction unit must conduct self-inspection to ensure project quality meets requirements. During acceptance work, strictly implement inspections according to acceptance standards. If problems are found, rectify them immediately. After the acceptance result is qualified, handle the completion acceptance filing procedures^[8].

4.4 Practical Case Analysis

A housing project with a construction area of 50,000 square meters, 25 floors above ground, using a frame-shear wall structure. During the construction phase, the construction unit adopted a series of effective quality control strategies: The construction unit selected experienced managers and technicians to form the project management team and conducted systematic training for construction personnel, enhancing their quality awareness and operational skills. Established strict material procurement and inspection rules; conducted strict inspection and testing of major incoming materials such as steel, cement, and bricks to ensure material quality met requirements; strengthened quality control of each process, especially key processes like concrete pouring and rebar tying, assigning dedicated personnel for supervision and inspection to ensure construction quality. For example, during construction, noticing cracks in some walls, the construction unit immediately organized technical personnel to analyze the problem, plan treatment measures, and tracked the entire treatment process to ensure the crack issue was effectively resolved. Ultimately, the project successfully passed the completion acceptance stage, achieving excellent quality standards, gaining recognition from the construction unit and relevant departments, and earning the enterprise good social reputation and economic benefits.

5. Conclusion

In summary, during the construction phase of housing projects, quality management is key to project success. By implementing a set of scientific, systematic, and comprehensive quality management strategies, the occurrence of quality problems can be effectively prevented and reduced, ensuring the project structure is solid, functions are complete, and it meets design requirements and user expectations. In the future development of housing projects, it is necessary to keep pace with industry trends, actively adopt new technologies and methods, gradually improve the quality governance system, enhance communication and cooperation among all participating parties, form a strong synergy for quality control, create safe, comfortable, and beautiful living and working environments for people, and promote the long-term healthy development of the construction industry.

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