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Key Points of On-Site Management for the Construction Party of Building Electrical Engineering Construction

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Abstract: In construction projects, electrical engineering is an important component, mainly including pre-installed conduits, embedded parts, grounding wires, etc., and it is carried out concurrently with the civil engineering. Managers should follow relevant standards to lay wires and cables and install and debug equipment to ensure their normal operation. Only when all the above aspects meet the predetermined standards can quality assessment and completion acceptance be conducted. Electrical engineering is related to the quality, progress, capital investment, and goal achievement of the entire project. Therefore, this article conducts an in-depth discussion on the key management points of the construction site for building electrical engineering projects.

Keywords: Construction project; Electrical construction; Construction party; On-site management

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1. Introduction

In the construction field, the management of the construction site is a critical aspect. This is particularly true for construction management in electrical engineering, which should not be limited to a single construction technique but should encompass the entire construction site to ensure construction quality. High-quality site management directly affects project progress, benefits, and safety. Therefore, this article discusses the key points of on-site management for the construction party in building electrical projects.

2. Importance of construction site management in building engineering

Construction site management plays a crucial role in building electrical engineering, directly impacting the smooth progression, quality assurance, safety control, and schedule execution of a project as follows:

(1) Site management is a key link in engineering quality control. Through reasonable construction

organization and material management, it ensures that all materials used meet specification requirements, thereby guaranteeing the overall quality of the project;

(2) Safety management is the core content of site management. Construction sites involve numerous pieces of equipment and complex processes, presenting various safety hazards. Implementing comprehensive and scientific safety management measures can effectively prevent accident risks, ensuring construction safety while protecting the lives and property of construction personnel and relevant individuals;

(3) Site management is an important guarantee for the orderly advancement of the project. Through scientific organization and meticulous planning, seamless transitions between various project stages can be achieved in a systematic manner, avoiding issues like schedule delays caused by poor management and reducing unnecessary economic losses [1].

3. Analysis of factors affecting the quality of construction site management in building electrical engineering

If the quality control of electrical engineering construction is improper, it may lead to serious consequences. Therefore, during the construction process of electrical engineering, it is essential to identify the numerous factors affecting construction quality and strengthen site management accordingly. The main factors influencing the quality management of building electrical engineering construction are as follows:

(1) Design of the electrical engineering: The construction quality of electrical engineering largely depends on the professionalism and thoroughness of the design. If the drawing design is not comprehensive enough and fails to fully consider actual construction conditions and operational requirements, it is prone to cause unforeseen problems during implementation, thereby increasing the difficulty of construction quality control;

(2) Installation and commissioning of electrical materials: The installation and commissioning of electrical equipment are key links in electrical engineering construction. If construction personnel do not strictly follow technical specifications and standards and operate based solely on subjective experience, it will directly affect the final quality of the project;

(3) Technical support during construction: The condition of construction equipment and the technical level of construction personnel are important foundations for ensuring project quality. For example, if equipment is put into use without inspection or if personnel operations are not standardized, it may lead to substandard project quality;

(4) Natural environmental factors: The natural environment significantly impacts the progress and quality of electrical engineering. If the environmental conditions at the construction site do not meet requirements, it can not only delay the schedule but may also cause substantial damage to the project quality;

(5) Degree of collaboration among construction personnel: The quality of electrical engineering construction relies on mutual cooperation among various departments. If problems occur in the handover of work at any stage, it will not only affect project progress but also increase project costs and may even impact the overall project quality [2].

4. Key points of on-site management for the construction party in building electrical projects

4.1. Project overview

The Eastern New Era Tower project is a high-rise building for commercial, office, and apartment purposes, with

a total building height of 147 meters. It features a three-story basement; the above-ground structure is a single 34-story commercial complex. Additionally, it is equipped with one high-voltage switchgear room and one high/low-voltage distribution room, ensuring safe power supply for the building. The power facilities also include dual-circuit high-voltage power supply lines and a 1005kW backup generator set located in the basement to handle emergencies, ensuring residents' normal living order remains unaffected.

4.2. Key points of on-site management for the construction party in building electrical projects

4.2.1. Construction drawing review

Before commencing building electrical construction, thorough preparatory work is essential. The construction party must have a profound understanding of the project's design drawings. When familiarizing themselves with the design drawings, they should check from an overall perspective whether the design is reasonable and complete. For instance, they should first check the "Building Schedule" to determine its completeness and ensure all sub-items are included. Then, they should carefully read the construction instruction manual to check whether the construction methods for engineering details are detailed enough. On this basis, it is also necessary to review the building mechanical and electrical engineering drawings and civil engineering drawings, and strictly audit the performance indicators of construction machinery to ensure all equipment meets design requirements (**Table 1**).

Table 1. Key considerations for drawing review

No.	Consideration
1	**Completeness of electrical engineering drawings:** Read through the entire set of drawings, compare with the drawing index, and check for missing drawings. Verify if the locations and elevations for lighting, communication systems, and cable laying in residential areas are reasonable
2	**Consistency of construction drawings:** Check for consistency among the electrical system diagrams, floor plans, detail drawings, general arrangement drawings, and referenced standard drawings for the electrical engineering. Ensure the design for power distribution and control complies with regulations from other disciplines
3	**Integration of electrical equipment drawings and civil drawings:** Check if the positions of walls, beams, and columns in the civil structure would affect the symmetrical layout of electrical appliances, lighting, etc. If such issues are not discovered and solutions sought before construction, they may lead to design changes later, causing economic losses
4	**Integration of plumbing & drainage drawings and electrical drawings:** Check for conflicts in the installation of bathroom fixtures, electrical wiring, and water supply/drainage pipes. Verify if the installation locations of fire protection equipment and distribution boxes conflict. Assess if the positions and heights of cable trays, bus ducts, wireways, etc., are reasonable and convenient for installation, avoiding clashes with air ducts, water pipes, etc.
5	**Pre-embedding for outdoor installations:** If outdoor lighting, CCTV cameras, burglar alarms, public address systems, etc., are to be installed, appropriate conduits should be pre-embedded to prevent future chiseling work
6	**Layout of pre-embedded conduits and openings:** Check if the layout of pre-embedded conduits and openings is reasonable and if their elevations and dimensions are clearly specified. Verify if the electrical safety protection measures in special areas like bathrooms meet relevant standards and acceptance criteria

4.2.2. Management during electrical engineering construction

The management of several aspects are as follows:

(1) Construction personnel: In construction site management, the management of construction personnel is a crucial task, as the overall quality of personnel has a significant impact on project quality. Usually, personnel engaged in electrical equipment installation work must hold corresponding qualification certificates. They need to have a solid theoretical foundation and rich practical work experience in order

to better complete the installation and construction of electrical equipment. When selecting electrical engineers, attention should be paid to their comprehensive literacy, theoretical knowledge, and practical operational skills. At the same time, attention should also be paid to the training and management of engineering supervisors to ensure that they fully play their due role in the project implementation process [3];

(2) Construction quality: Before the implementation of electrical engineering, design drawings should be comprehensively reviewed to assess their rationality and feasibility. Any deficiencies found should be promptly communicated with the design unit to optimize the design plan. During the construction process, dynamic management should be implemented, with full-process monitoring of key procedures and work links, achieving early prevention and timely correction of quality issues, thereby systematically improving project quality;

(3) Electrical engineering progress: Progress control in electrical engineering is a core aspect of project management. To ensure on-time completion, management personnel need to strictly supervise the construction unit in organizing construction according to the time nodes stipulated in the construction contract, regularly formulate and inspect progress plans, and conduct in-depth analysis of the causes of progress deviations. If there is a risk of schedule delay, the contractor should promptly adjust the construction plan. Through systematic progress management, ensure the project meets overall schedule requirements;

(4) Electrical engineering investment: When managing electrical projects, investment control requires electrical management personnel to have a deep understanding of the contract agreement between the construction party and the owner. They must be clear about the different impacts various treatment options have on project investment. Simultaneously, electrical management personnel should conduct detailed reviews of electrical design elements that affect project investment costs. Furthermore, the review of monthly reports for electrical engineering must be rigorous. Management personnel should ensure that all records of site instruction work follow the principles of seeking truth from facts and being fair and reasonable, guaranteeing the quality of construction site instructions meets standards and quantities are accurate. At the same time, planned costs should be regularly compared with actual expenditures to take necessary control measures [4];

(5) Strengthening safety management and supervision in electrical engineering: To enhance the level of safety management in electrical engineering, the first step is to strengthen the safety awareness of construction personnel and standardize on-site operations. It is recommended to establish dedicated safety inspection teams to regularly conduct safety assessments and hidden hazard investigations. Safety management should adhere to the principle of "prevention first, safety first," organizing safety knowledge and skills training based on the actual project conditions and assigning qualified safety management personnel. During the installation of electrical equipment and temporary electricity usage, relevant safety regulations must be strictly followed to effectively prevent safety accidents;

(6) Commissioning stage of electrical construction: The electrical commissioning stage is a critical link for comprehensively inspecting the performance of the entire power system. Management personnel need to ensure the normal operation of all electrical equipment, including lighting systems, distribution box labeling, and equipment functions. The commissioning process should strictly follow manufacturer instructions and design drawings, checking performance parameters item by item. This stage requires the collaborative participation of the power department, various professional management personnel, and user

units to jointly supervise installation quality and operational status, laying the foundation for subsequent system operation and maintenance;

(7) Acceptance and handover to property management (i.e., the User Unit) stage: Acceptance standards are key to ensuring the quality of the power engineering project. When conducting acceptance work, electrical equipment and related materials should be carefully inspected to ensure they comply with relevant specifications and safety requirements. Additionally, it should be ensured that the layout of electrical circuits is reasonable, the installation of electrical equipment is appropriate, and safety protection measures are complete.

During handover to the property management, all certificates of conformity, inspection reports, and qualification certificates of the manufacturers for the electrical equipment should be handed over simultaneously. Furthermore, during the handover of electrical equipment, necessary technical briefings and training on the operational procedures, usage, and maintenance precautions of the electrical equipment should be provided to the property management's professional personnel. This ensures that after appropriate training, the property management's professional personnel can proficiently master the equipment operation procedures, which is also key for the project to smoothly enter the operational phase.

5. Problems in the construction party's site management

5.1. Incomplete management system

Among many construction party staff, there is not yet full awareness of the core position of construction site management, and the study of safety production regulations has not received due attention. During building electrical construction, operations often rely on past experience. The various on-site management regulations within the construction unit lack completeness and applicability, making them difficult to implement effectively in construction project management.

5.2. Unclear responsibility and authority in safety management

A prominent issue in the current construction party's construction project management process is the unclear definition of responsibilities and authority within the safety management system. This affects the thorough execution of safety management responsibilities, which often remain merely formalistic, unable to truly ensure the production safety of the construction unit. As the primary responsible party for construction safety management, the construction party's power and responsibilities are limited not only internally but also influenced by numerous external factors, making it difficult for the safety management system within the construction enterprise to operate independently and effectively. When major accidents occur, limited authority often prevents effective measures from being taken during critical periods, thereby missing the optimal resolution timing. This renders the safety production management of building electrical engineering projects merely theoretical.

5.3. Improper handling of safety accidents

During the construction phase, major safety accidents often occur, which are often related to insufficient handling capabilities of relevant personnel. Loose management has led some safety production managers to overly focus on personal interests and insufficient investment in on-site management, resulting in a mentality of taking chances in actual work.

6. Strategies to strengthen the construction party's site management

6.1. Improve the safety management system

Within the construction enterprise, from senior managers down to grassroots employees, everyone needs a comprehensive understanding of the safety management system. To achieve this goal, it is necessary to formulate a set of effective safety prevention measures based on different situations throughout the entire construction process and to delineate responsibilities and authority for each link. Additionally, the construction enterprise should formulate corresponding lists of powers and responsibilities to maximize the functionality of the system.

6.2. Clarify safety management responsibilities and authority

The safety management system of the construction enterprise needs continuous adjustment and optimization to ensure that safety responsibilities at various construction stages can be clearly divided and that responsibilities and authority can be effectively personalized and allocated. At the same time, it is necessary to further improve the internal reward and punishment system, extending the performance evaluation system to all departments of the enterprise, especially incorporating safety production indicators into the enterprise's performance evaluation. Strengthening the reward and punishment system can ensure that everyone clearly knows their responsibilities and authority, enabling them to better perform their functions and create a better working atmosphere.

6.3. Strengthen pre-construction and in-construction control

When managing the construction party's enterprise, strict qualification reviews must be conducted for all construction units participating in the project. Additionally, the construction enterprise should have detailed safety briefing documents, ensuring the technical level of workers, providing guarantees for the construction party, and ensuring smooth project progression. The construction party should implement a continuous safety inspection strategy, promptly discover hidden dangers on the site, timely resolve existing problems, and continuously urge the construction unit to improve the level of construction safety management.

7. Conclusion

In summary, in the modern construction industry, on-site management by the construction party in building electrical projects is a crucial link in ensuring construction safety and quality. To guarantee the normal operation of electrical systems within buildings, strict quality monitoring of the site is necessary. Therefore, the construction party must have a profound understanding of the various elements of electrical engineering site management and be aware of the various factors affecting its quality. Only in this way can the efficiency and quality level of management work be significantly improved.

Disclosure statement

The author declares no conflict of interest.

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