Countermeasures for On-site Construction Management of Municipal Road and Bridge Engineering

Qiupeng Zhong

Suzhou Key Projects Construction Administration Bureau, Suzhou, Anhui, 234000, China

Keywords: Municipal road and bridge engineering; On-site construction management; Problems; Countermeasures

Abstract: Municipal road and bridge engineering is an important constituent part of urban infrastructure, the construction quality safety directly influences city operation efficiency and resident life quality. On-site construction management is the on-site operation of municipal road and bridge engineering, which belongs to the core content.Internal necessary means, this paper deeply analyze the importance of on-site construction management work in municipal road and bridge engineering, research current situation of on-site construction management work in detail for a large number of problems existing in our country's current site construction management work, at the same time put forward guided measures against various problems existing in field building project. The intention is to provide useful references for improving the quality of on-site construction management in municipal road and bridge engineering, so as to guarantee the high-quality and efficient completion of projects.

1. Introduction

Municipal road and bridge engineering is the lifeblood of urban development, an irreplaceable part of promoting economic cooperation between regions, optimizing residents travel conditions, and increasing the city image. The construction scale of municipal road and bridge engineering is constantly expanding, the construction difficulty day by day with the acceleration process of urbanization. In such conditions, the role of on-site construction management becomes even more apparent. If good on-site construction management is possible, it can reasonably allocate resources, ensure the safety of construction, improve project quality, control project costs and conduct projects in accordance with established objectives. But there are still a large number of problems in the present site construction management of municipal road and bridge engineering, which restrains the proper development of project construction. Based on this, it is of great practical significance to carry out in-depth research and take targeted countermeasures to solve these problems.

2. The Importance of On-site Construction Management in Municipal Road and Bridge Engineering

2.1 Ensuring Project Quality

The quality of the engineering works is a foundation project in municipal road and bridge engineering, which has a direct impact on its service functions and service life. Quality control can be done efficiently on the site due to presence of strict quality control system [1]. The raw materials, components and equipment are strictly inspected to ensure that unqualified materials are prohibited from entering the construction site. It carries out real-time supervision of each construction process and operation procedure to ensure that "each process" is in accordance with design specifications and standards. Take pouring concrete, for instance; the mix proportion, sequence of pouring (where it will start and where it will go next), vibrating quality are all closely monitored by managers to avoid honeycombing, pitting, cracks etc. Refined construction management not only can effectively reduce common quality problems, but also bring about the improvement of the overall quality level of the project, thus laying a good foundation for the long-term use of municipal road and bridge

  DOI: 10.25236/icacel.2025.207

engineering.

2.2 Ensuring Construction Safety

Municipal road and bridge engineering has a complex construction environment with high-altitude work, deep foundation pit excavation and large-scale machinery. Even a small negligence may cost safety accidents. Establishing a reasonable safety production responsibility system, clarifying the safety work obligations of managers and operators at all levels, guaranteeing the effective implementation of safety management on the construction site. Safety education and training, as well as emergency drills to improve the awareness of construction personnel on disaster prevention and rescue capability. On-site construction safety warning signs are clear, and the necessary safety protection equipment is controlled. Hazardous areas are segregated and secured. Only by adopting the overall safety management, can safety accidents occur and reduce to prevent safe life manager personnel health harm, ensure the social order and stability.

2.3 Controlling Project Costs

Municipal road and bridge engineering is characterized by a large investment scale. The primary task of project cost control directly determines the project's economic and social benefits. On-site construction management optimizes construction plans, reasonably arranges construction orders and tasks, fully utilizes resources to avoid idle labor and resource waste, strengthens engineering change management, strictly controls the scope of changes in terms of costs so as to prevent excessive value loss due to changes. In addition, it reinforces cost accounting and analysis to understand the real-time trend of costs and generates warnings and adjusts for projects over the budget. Project partners can conserve project price to the very best extent beneath the condition of ensuring venture quality and safety through implementing a refined value management model, thus promoting the large economic effectiveness of projects [2].

2.4 Enhancing Corporate Image

The municipal road and bridge engineering is generally paid high attention by the society, and the enterprises construction management level directly affects enterprise image and reputation in the society. Construction management on site can improve the image of corporate civilization through constraints or regulations over builders' behaviors, have a clean and orderly construction land, reduce adverse influence on surrounding environment as well as residents' daily life and show good social responsibility. Quality project performance and good safety records can gain the recognition and trust of owners, supervisors hosted by all sectors of society, establish a good brand image. Having a better corporate image helps the company to be more competitive in the market and win more project opportunities, thereby achieving long-term and stable development.

3. Problems in On-site Construction Management of Municipal Road and Bridge Engineering

3.1 Personnel Quality Issues

The overall professional level of managers is low:Some of the on-site managers do not have systematic professional knowledge and lack practical experience, and have a limited understanding of construction specifications and technical requirements. Thus, they fail to control construction effectively in the course of management work and struggle to solve technical problems encountered during construction [3].

Uneven Skill Level of Construction Personnel: Municipal road and bridge engineering requires a large number of construction personnel of different trades. Some construction personnel have poor skill levels, lack necessary training and assessment, and operate in non-standard ways, which may affect project quality and construction safety.

Weak Safety Awareness of Personnel: Some construction personnel do not pay enough attention to safety regulations and operation procedures, hold a fluke mentality, and do not wear safety protection equipment as required, bringing great safety hazards to the construction site.

3.2 Material and Equipment Management Issues

Poor Control of Material Quality: Some procurement personnel take personal benefits and choose inferior materials, or they do not strictly review supplier qualifications, so that the quality of materials delivered to the site is unreliable. There is no strict management to storage, the material cleaning at the site produces a large quantity of construction waste, and it leads to shaking during storage as well how about material damping and deterioration.

Lack of Equipment Maintenance and Proper Care: Construction equipment is a major tool to guarantee the smooth progress of the project, but some companies neglect daily maintenance and upkeep of construction machinery, do not perform regular inspection and care on their machine, resulting in frequent breakdowns that affect the construction process and quality of work.

Unreasonable Distribution of Materials and Equipment: When constructing on site, there is not a scientific planning to distribute materials and equipment, so sometimes some construction links lack material support, but some equipment does not work for a long time, seriously wasting resources and leading to low construction efficiency.

3.3 Construction Schedule Management Issues

Schedule Plans are Formulated Based on an Idealistic Basis: For some projects, when formulating construction schedule plans, the actual situation of the project (including construction conditions and material supply) is not fully considered, resulting in schedules that are too idealistic during actual construction.

Weakness of Schedule Control: Among the construction process, there is no method architecture for effective schedule monitoring meanwhile it is hard to catch up with the deviations during a short time and take adjustment actions. nor are there targeted response plans for the forces that impact schedule performance including inclement weather and design changes causing schedule slips.

Poor Coordination and Communication: Municipal road and bridge engineering involves multiple participating units, such as the construction unit, the construction contractor, and the supervision unit. There is obstruction in coordination and communication among these units, and information transmission is lagging, which easily leads to delays in the construction schedule.

3.4 Safety and Quality Management Issues

Incomplete Safety Management System: Some companies have defects in their safety management systems, with unclear safety responsibility divisions and inadequate implementation of safety inspections and hidden danger investigations, resulting in a large number of safety hazards on the construction site [4].

Insufficient Quality Supervision: During the construction stage, quality supervisors fail to serious inspection and control for key processes and concealed works in the engineering construction process, leading to missed inspections; exaggerated judgement or poor maintenance of relevant work documents. When quality problems are identified, remediation takes longer than necessary and is not thorough enough to avoid repercussions for project quality.

Weak Emergency Response Ability: In the event of sudden safety incidents and quality accidents, individual companies do not have reasonable emergency plans and emergency response mechanisms to take timely rescue measures, which leads to continuous expansion of accident losses.

4. Countermeasures for On-site Construction Management of Municipal Road and Bridge Engineering

4.1 Strengthen Personnel Management

Enhance the professional quality of managers: Enterprises can regularly organize professional training and learning exchange activities for managers, invite experts in related fields to teach, further update the knowledge structure of managers, improve their professional level and management ability. They should also support managers in taking relevant professional

qualification examinations and obtaining corresponding certificates [5].

Enhance Construction Worker Training: Construction personnel skill training is widely implemented, the content of which should include construction processes, operation regulations and safety knowledge. At the end of every training, strict checks should be done and only those who clear them should be allowed to work. In the process of constructing, we should regularly carry out skill competition and technical exchange activities to mobilize the enthusiasm of construction staff for learning, stimulate their enthusiasm and initiative in learning, continue to improve their skill level.

Strengthen Safety Awareness Education for Personnel: Safety awareness and self-protection capabilities of construction personnel should be strengthened through activities such as safety knowledge lectures and safety drills. Eye-catching safety warning signs should be set up at the construction site to remind construction personnel to be careful. A sound safety reward and punishment system should be established to reward those who comply with safety regulations and punish those who violate regulations, creating a good safety environment [6].

4.2 Optimize Material and Equipment Management

Strictly Control Material Quality: A complete material procurement management system should be established, and suppliers with good reputation and high-quality products should be selected. Before material procurement, a comprehensive investigation and evaluation of the supplier's qualifications, reputation, and product quality should be carried out. When materials enter the site, they should be inspected and accepted strictly in accordance with corresponding standards and specifications, and unqualified materials should be resolutely returned. Effective material storage management should be strengthened, and appropriate storage methods should be adopted according to the characteristics of the materials to ensure that the material quality is not affected.

Strengthen Equipment Maintenance and Upkeep: A detailed equipment maintenance and upkeep plan should be formulated, and equipment should be inspected, maintained, and serviced regularly. Equipment maintenance and upkeep files should be established to record the equipment's maintenance and upkeep situation and fault handling situation. Management and Maintenance of Key Equipment: Either management or maintenance personnel specializing in key equipment should be assigned to manage the transition, ensuring that the equipment is kept in good operating condition at all times.

Scientific allocation of materials and equipment: that is, according to the construction schedule plan and actual construction to scientifically and reasonably determine the allocation of materials. The management system of materials and equipment should be managed in a dynamic way, obtaining real-time data information regarding the inventory and usage status of materials and equipment through scientific management methods, timely adjusting the allocation plan to avoid material shortage or even waste due to idleness.

4.3 Strengthen Construction Schedule Management

Establish Reasonable Schedule Plans: When determining the construction schedule plans, it is necessary to have a comprehensive consideration of the actual situation of the project, such as construction conditions, resources supply and technical difficulties. Therefore, what is needed to scientifically and practically optimise the intended schedule plans is sophisticated project management software. The general plan is to divide it into monthly, and then weekly; staged work tasks and goals are an important part of the process [7].

Strength Schedule Control: They are required to set up a full control system, and continuously check the schedule of construction in regular intervals. Problems will be found on time, and the adjustment plan should be invented based on this. The basis of comparison is the actual schedule - planned schedule. Advance plans need to be developed prior to the impact of these factors in the schedule for effectively mitigating their effects on project execution, especially with respect to bad weather and design changes.

Improve joint coordination and communication: From the upper levels of the scientific unit, a coordination and communication mechanism should be established between all participating units

to ensure information exchange and contact. Such routine project meetings must be arranged to provide grounds for issues that might arise in between construction projects successful run. An information platform should be built to realize the transmission and sharing of different units in real time, so as to enhance work efficiency.

4.4 Improve Safety and Quality Management

Perfect the Safety Management System: A complete safety management system should be established, the safety responsibilities of managers and construction personnel at all levels are clear, detailed safety operation rules and safety inspection requirements are formulated, and safety inspections hidden dangers in construction sites should not be inferior. Immediately issue rectification notices against those safety hazards found, specifying both the rectification responsibility personnel and the rectification deadline, and following up on the rectification results to ensure that the hazard is completely eliminated [8].

EstablishA strict q uality supervision system to strengthen the quality control of construction effectively. Quality supervisors shall carry out strict examination on key process and concealed works according to standards, specifications and other defining documents to guarantee that the quality of projects meet the standards. For identified quality problems, rectification notices should be issued promptly, requiring the construction unit to complete the rectification within the specified time limit. After the rectification is completed, re-inspections should be carried out to ensure that the quality problems are completely resolved.

Improve Emergency Response Capability: Enterprises should formulate comprehensive emergency plans, clarify the emergency organization structure, emergency response mechanisms, and emergency rescue actions. Regular emergency drills should be held to improve the emergency response capabilities and coordinated operation levels of construction personnel. Necessary emergency rescue equipment and materials should be equipped to ensure that rapid rescue and handling can be carried out when sudden safety incidents and quality accidents occur, reducing the losses caused by the accidents.

5. Conclusion

In conclusion, on-site construction management of municipal road bridge engineering is a systematic project on personnel, material, equipment, schedule safety and quality. In terms of on-site construction management, municipal road and bridge engineering is still facing a large number of problems, which seriously hinder the smooth progress of urban infrastructure projects and restrict the project quality. Through reasonable personnel allocation and scientific training, the overall quality of the team will be improved. Only strict quality control of materials and equipment can provide a solid foundation for the project. Integrating advanced technologies and optimising strategies will facilitate the efficient execution of the project. In the future municipal road and bridge engineering construction, innovative management methods should continue to be explored and flexibly apply them according to the actual situation; that may create more high-quality municipal road vehicle traffic bridge projects, which will lay a reliable foundation for urban prosperity and development, so as to make urban traffic smooth.

References

[1] Li Bo. Difficulties and Solutions in On-site Construction Management of Municipal Road and Bridge Engineering [J]. Urban Construction Theoretical Research (Electronic Edition), 2024 (27): 133-135.

[2] Zhou Wei. Exploration of Effective Strategies for Strengthening On-site Equipment and Construction Management in Municipal Road and Bridge Engineering [J]. China Plant Engineering, 2023 (23): 70-72.

[3] Gu Faxiang. Difficulties and Solutions in On-site Construction Management of Municipal Road

and Bridge Engineering [J]. Urban Construction Theoretical Research (Electronic Edition), 2023 (31): 67-69.

[4] Han Minglun. Countermeasures for Strengthening On-site Construction Management of Municipal Road and Bridge Engineering [J]. Engineering Construction and Design, 2023 (6): 225-227.

[5] Wang Lin. Exploration of Effective Strategies for Strengthening On-site Equipment and Construction Management in Municipal Road and Bridge Engineering [J]. China Plant Engineering, 2022 (24): 207-209.

[6] Chen Huigang. Countermeasures for Strengthening On-site Construction Management of Municipal Road and Bridge Engineering [J]. Bulk Cement, 2021 (6): 55-57.

[7] Wang Jisheng. Difficulties and Solutions in On-site Construction Management of Municipal Road and Bridge Engineering [J]. New Industrialization, 2020, 10 (12): 53-54.

[8] Sun Quanlong. Analysis of Difficulties and Countermeasures in On-site Construction Management of Road and Bridge Engineering [J]. Modern Property (Mid-Issue), 2020 (2): 150-151.