

Analysis of Civil Construction Management and Paving Technology in Landscape Engineering

Chen Bao

Xuancheng Municipal Engineering Construction Management Department, Xuancheng, Anhui, 242000, China

Keywords: Landscape Engineering; Civil Construction Management; Paving Technology; Quality Control

Abstract: Against the backdrop of accelerating urbanization, people's requirements for ecological environment quality are becoming increasingly stringent. Landscape engineering, a key project for improving urban ecology and beautifying the living environment, is seeing a growing scale and number. During the implementation of landscape engineering, civil construction management and paving construction are core processes that directly affect the project's quality and landscape effect. The scope of this paper is divided into two main areas: civil construction management and paving technology in landscape engineering. The importance of civil construction management is analyzed, reasonable and effective management measures are proposed (including planning management on construction site resources, whole-process quality control, digital technology application promotion, risk prevention and control system building) and the common paving technologies for landscape engineering are introduced combined with examples from real projects to provide strong reference for the high-quality development of landscape engineering.

1. Introduction

Landscape engineering encompasses civil construction management and paving technology. Scientific and rational civil construction management can effectively ensure that the landscape project is carried out in accordance with the established plan, coordinated various resources, to prevent construction chaos or even delay delivery; An exquisite paving technology can highlight the unique charm of landscape engineering; combinations of different materials and colors, it provides a rich and diverse spatial atmosphere, improves the ornamental value and experiential quality of the landscape. Thus, detailed study of civil construction management strategies and paving technologies in landscape engineering is highly significant for enhancing landscape project construction quality.

2. Importance of Civil Construction Management in Landscape Engineering

Civil construction management is a crucial link that guarantees the seamless advancement of landscapes. In civil construction of landscape engineering, from the quality assurance perspective, road paving and rockery constructions is one of the important parts that closely link different processes, which are closely related to the overall landscaping structure, including directly influence on construction issues. So long as good measures to prevent quality problems in construction management can be taken, and the buried subsidence of soil structure is avoided (like unstable foundations and road surface fractures), it will lay the foundation for landscape project of longer-term stability. At the same time, reasonable construction management is to formulate scientific construction plans, clarify different stages and timelines within them, coordinate the connection between different processes, identify major factors affecting construction in advance in a timely manner And solve related problems to ensure that the project can be delivered as scheduled within the statutory period. In addition, the key of construction management is accurate quantification of work, rational assignment of human resources, material resources and financial resources, reasonable optimization of construction scheme and good economic benefit of landscape

engineering project.

3. Effective Strategies for Civil Construction Management in Landscape Engineering

3.1 Rational Planning of Construction Site Resources

In the landscape engineering civil construction management, the planning of construction site resources should be considered from three aspects: personnel, materials and equipment. The number of required workers (of types) in-personnel management should be calculated based on the project schedule. A scientific and reasonable performance appraisal system should be established, the work results closely combined with the compensation mechanism, good timely commendation and material rewards to outstanding teams and individuals. The material management should make a specific, clear plan of the need for construction materials according to the design and construction schedule, detailing what type (type), specification information is relevant during each phase. So, according to the paper, the main answer is that manufacturers should establish long-term cooperative relationships with high-quality suppliers and avoid postponing such cooperation in order to ensure timely delivery of stable materials. All incoming materials are strictly checked to avoid inferior materials entering the construction site ^[1]. Less tolerant of moisture or damage Materials require a separate storage with moisture-proof, fire-proof and anti-theft measures; From the perspective of equipment planning, specific types should be selected based on landscape project attributes and performance characteristics to attain species abundance. Even you should formulate daily equipment maintenance management methods, including regular inspections and repairs and make sure that all equipment has been fully maintained from beginning to end so as to ensure the good technical performance of equipment, in order to reduce downtime caused by mechanical failure. The reasonable scheduling of the operation time and sequence can eliminate idleness and overuse, and improve the efficiency of equipment utilization. Furthermore,, the site itself is some of the most valuable resource in space. Reasonably divide the site into working area, material storage area and processing area by construction unit. BIM-based simulation of site layout could be useful and the interspersed of non-critical tasks must be centrally organized in a way, which can save occupancy time of all resources indirectly.

3.2 Implementing Whole-Process Quality Control

Whole-process quality control of landscape engineering civil construction management is the key to ensure the engineering quality realized design intention. Before construction, it is necessary to form a professional and technical management team with an appropriate scale so that there will be a clear division of responsibility for quality management between various team members, thereby ensuring orderly quality management work. Construction unit must strictly review the eligibility of the construction team and workers work certificate, requiring workers to have the corresponding skill level. Incomes of raw materials, components, and equipment should be inspected strictly through a sampling re-inspection if necessary so as to avoid substandard articles to enter the site. It is necessary to formulate practical and specific construction schemes according to the characteristics and requirements of the project, clarify quality objectives and relevant control measures, provide scientific guidance for construction. Monitor and strengthen process control and on-site supervision of the civil construction phase. Requirements, establishing inspection standards at key processes and special procedures; standing supervision system of personnel to ensure that construction quality meets requirements. Conduct regular quality inspections and hidden danger investigations. Prompt issuance of rectification notices for identified quality issues followed by persistent follow-ups until problems are effectively resolved. Implemented handover inspections between processes and verify quality throughout the sequence. From this perspective, the influence of construction environment on quality should be attached great importance, drainage: concrete curing and other protective measures according to weather changes. In addition, GPS measuring instruments can also be used for calibration during construction to ensure accuracy in positioning and setting out, and drones can be equipped for earthwork quantity calculation so as to achieve

digitalized and visual process management. Post-construction, civil works will be inspected, measured visually and tested functionally in accordance with design and code requirements, ensuring all indicators meet the standards for acceptance. Before the overall project is delivered and after final acceptance, construction units shall take measures to protect finished products, so as not to pollute or damage completed civil surfaces, features and other projects by subsequent construction operations. A complete quality traceability file should be created during the whole construction process, where all the completed quality records and acceptance documents are held. Once the landscape project is over, a quality review meeting needs to be held in a timely manner so that successes and failures stand out, as a basis for learning from them in future projects.

3.3 Promoting the Application of Digital Technology

In landscape engineering, civil construction management should actively promote the application of digital technology. The transformative power of public digital technology on civil construction management can no longer be ignored when it comes to project management, and it is important for corporate strategic planning purposes. All construction units need to organize training classes for managers and workers on digital technologies, practicing application of new information technology such as BIM, GIS, drone surveying; Inviting industry experts regularly to give lectures and case sharing so employees can intuitively feel the digital transformation efficiency improvements. It is based on this that construction units should take advantage of the advantages of digital technology to establish a comprehensive digital management platform. With the application of BIM technology, 3D models can make a comprehensive analysis of landscape civil engineering layout, structure and details, foreseeing design conflicts/ construction difficulties. By using the merits of GIS technology, construction units to conduct overall planning for geographic information data, so that it is possible to determine a more accurate basis for site layout and earthwork balance calculation. In order to promote the use of digitalization in management civil construction, it is necessary invest more in equipment digital. The use of drones allows panoramic images of the construction site to be captured quickly to be able to identify violations and safety hazards without delay. By equipping mobile terminal devices, construction personnel can have real-time access whenever and wherever they need to the digital management platform, achieving information sharing and collaborative work at the same time ^[2]. At the stage of management during construction, it is necessary to formulate an unambiguous digital strategy blueprint at the very beginning, so as to clarify how a certain application should achieve its goals and plans for implementation without blindly investing resources. This involves selecting one or more pilot applications, in which digital technology can be applied to a single key project or process, and then scaling these efforts across all other projects when they have been successful.

3.4 Building a Safety Risk Prevention and Control System

Landscape engineering civil construction management should establish a comprehensive safety defense and risk control system. Form a safety management leadership group centered on the project manager, clarify the authority and responsibility of managers at all levels and construction teams in terms of production safety and draft letters of responsibility for production safety; decompose production safety responsibilities down to people. Specialists should be ready to make thorough site surveys setting up possible safety hazards such as earth collapse, falls from height, and mechanical harm even before construction. Scientifically determine the risk to develop tiered prevention and control strategy according to different levels of risk. There should also be regular safety education and training among workers in the construction unit. Enhance workers' safety awareness and operational skills through case analysis, on-site demonstrations, etc. Daily safety inspections are to be conducted at the construction site of landscape engineering, with monitoring focusing on temporary electricity, scaffolding, construction machinery and other key areas and links to prevent relevant safety problems from occurring. Real-time monitoring of data such as displacement and settlement shall be performed by professional instruments for high-risk works like deep foundation pits and high-formwork. As soon as abnormal data is detected, alerts should be triggered and emergency plans initiated. The investigation results of the safety hazards and accident

lessons should be fully recorded, establish a PDCA closed loop, continuously optimize the risk control system, ensure intrinsic safety in all construction process.

4. Analysis of Paving Technologies in Landscape Engineering

4.1 Stone Paving Technology

As a necessary means of achieving beautiful landscape environments, stone pavement technology is the most important link related to the craftsmanship of paving art; the use problems are mainly about how human beings feel when they interact with these arts and crafts in reality, and directly affect the overall quality and user experience of the landscape. During the construction preparation period, it is necessary to choose stones. Verify the stone details against design requirements for specifications, dimension and texture, looking out for major defects like cracks or chips or missing corners. The base course must be carefully spent free of all detritus, fortifying the standing and stability. Concrete (some thickness) should be poured as the cushion layer to offer stone paving a stable ground ^[3]. The layout work during stone pavement is very important. Technical personnel according to the design pattern set control lines and edge lines, then accurately snap the line of blocks placing position and sequence. The act of dry laying the stones on the ground prior to formal laying is usually used to adjust the sizes of gaps and how a letterhead will intermingle with other initial elements creating an overall visual effect. Only 1 ~ 2 days after the completion of stone paving, grouting or sweeping of joints can be finished. In the case of joints that are tight, usually a special grout or very viscous cement paste is used for filling and compaction. In the case of natural seams such as ice crack patterns, fine sand or cement dry mix are typically swept into the joints during manufacture, which is then watered for settlement. Concrete needs to be cleaned promptly after paving; watering for curing or covering with soil. Vehicle traffic or any significant impact is avoided during the curing period.

4.2 Colored Concrete Stamping Technology

For colored concrete stamping technology of landscape engineering has its unique artistic expression characteristics and practical advantages. This technology is based on Portland cement or Ordinary Portland Cement mixed with special additives and wear-resistant aggregates. By means of on-site pouring or mold stamping, it is able to create a variety of scenarios in the surface structure of concrete such as stone imitation, wood, brick, and more. Specifically, in the order of implementation, the base course which is compacted plain soil state affected layer has a dense and flat crushed stone cushion along with a concrete cushion layer; so that they can provide stable support for the surface layer. After that, concrete in a strength class greater than C25 is poured and the slump is maintained between 70mm and 95mm. After complete compaction by plate vibrator for knocking down, rolling and slurry to raise out surface pores and sand/stone with the purpose of eliminating hollows. After the strength of concrete reaches the standard, the dust should be removed from water washing, and a double polyurethane sealer is sprayed to form a transparent protective layer against UV rays and acids and alkalis.

4.3 Permeable Brick Paving Technology

Permeable brick paving technology is a key factor in the construction of permeable ecological sponge garden paths. You need to build it according to the laws of base course strengthening and permeability continuity. The choice of substrate structure in the base course treatment is a composite one, consisting of graded crushed stone and permeable concrete. The compaction degree of the soil base shall be isolated before construction, and must not be lower than 93%, and the drainage slope is set at 1%. At the stage of setting-out and positioning, according to the pattern, lines should be snapped out. This ensures that your paving lines are nice and clean. The landscape also recommends herringbone or stack bond patterns for pedestrian paths. Vehicle roads must be made from interlocking paving to ensure general cohesion. Permeable bricks must have a high equivalent compressive strength. Permeability tests and flatness inspections are conducted after

construction is complete.

At the point when paving is finished, preliminary cleaning ought to be done immediately. Spread a layer of medium-fine sand over the top of the landscape bricks and use a broom to sweep sand into the joints until they are completely filled. This helps hold the bricks in place and adds even more stability. The last step involves gently compacting the whole surface with a small vibratory roller or plate compactor in order to make sure each brick is properly level and seated. Site cleaning is done after all processes are finished as this process involves clearing excess sand material.

4.4 Wood Decking Technology

Wood texture element carries a natural, rustic tone produces warm atmosphere in garden space and soft visual effect of wood decking technology for landscape engineering ^[4]. This technology specializes in choosing decay-resistant wood. The main include mongolian scott pine (*Pinus sylvestris* var. *Mongolica*) and it is a reasonably priced semi-pliant material which may function outdoors without alter post treatment. Merbau (*Intsia* spp.) has great durability and stability with perfect long-term performance. The ground needs to be cleared of debris before construction, as soil from the base of a deck must be compacted to achieve solid support for the wooden decking. An underground moisture barrier membrane needs to be laid during the installation to prevent underground moisture from eroding the wood. The spacing of wooden joists is in a general controllable range, which is around 30-50 cm max often and can be adjusted according to the wood specifications and design requirements. Immediately after installation, wood chips and dirt should be removed. Even if the wood is treated with preservatives, a special paint or oil for wood should be used — this gives it enhanced moisture resistance, UV resistance and wear resistance as well as highlighting the natural texture of the wood and enriching the landscape effect. In addition, as part of subsequent upkeep it should be verified that items such as fasteners are not loosening and that wood is not beginning to decay, so the landscaping job retains its optimum presentation in the future.

5. Conclusion

Summary, civil construction management and paved technology in landscape engineering work together to promote the highquality development of the project. Reinforced civil construction management, the rational personnel arrangement and material management are the fundamental guarantee of these, and even paving technology can satisfy the aesthetic various needs that people put forward to landscape engineering. As technology continues to move forward, it raises ever-higher demands on the ecological environment. Based on the above considerations, in landscape engineering project construction: first of all, it is necessary to strengthen construction site resource planning; secondly, we should pay close attention to the whole-process quality control; then exploratory study and application of digital technology such as BIM and big data analysis should be strengthened; in addition, an entire process safety risk prevention and control system should be built with a view to designing a comfortable pleasant green landscape space.

References

- [1] Liang Meirong. Discussion on Civil Construction Management and Paving Technology in Landscape Engineering [J]. *China Construction*, 2025(20):28-30.
- [2] Zhang Zhen. Technical Management and Research in Civil Construction of Landscaping [J]. *Building Materials and Decoration*, 2023, 19(35):31-33.
- [3] Pan Yiwei. Research on Refined Management of Landscape Civil Engineering Construction [J]. *Ju Ye*, 2023(11):236-238.
- [4] Li Weiyan. On-site Construction and Management of Landscape Greening Engineering [J]. *China Real Estate Industry*, 2024(9):130-133.