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. This paper focuses on two major areas: civil construction management and paving technology in landscape engineering. It analyzes the importance of civil construction management, proposes reasonable and effective management measures—such as planning construction site resources, implementing whole-process quality control, promoting digital technology application, and building a risk prevention and control system—and introduces common paving technologies in landscape engineering, providing a strong reference for the high-quality development of landscape engineering.

1. Introduction

Civil construction management and paving technology are core components of landscape engineering. Scientific and reasonable civil construction management ensures that landscape projects progress steadily according to plan, coordinates various resources, and avoids issues like construction chaos or delays. Exquisite paving technology can showcase the unique charm of landscape engineering; combinations of different materials and colors can create rich and diverse spatial atmospheres, enhancing the ornamental value and experiential quality of the landscape. Therefore, in-depth exploration of civil construction management strategies and paving technologies in landscape engineering is of great practical significance for improving the construction quality of landscape projects.

2. Importance of Civil Construction Management in Landscape Engineering

Civil construction management is a necessary link for ensuring the smooth progress of landscape projects. From a quality assurance perspective, civil construction in landscape engineering includes tasks such as road paving and rockery construction, where each step relates to the overall quality and durability of the landscape. Effective construction management measures can avoid quality issues like unstable foundations and road surface subsidence, laying a good foundation for the long-term stable use of the landscape project. Simultaneously, reasonable construction management enables the formulation of scientific construction plans, clarifies different stages and timelines, coordinates the connection between different processes, identifies and resolves major factors affecting construction in a timely manner, and ensures the project is delivered on schedule within the stipulated timeframe. Furthermore, construction management allows for precise calculation of work quantities, rational allocation of human, material, and financial resources, promotes

  DOI: 10.25236/icacel.2025.129

reasonable optimization of construction schemes, and enhances the overall economic benefits of the landscape engineering project.

3. Effective Strategies for Civil Construction Management in Landscape Engineering

3.1 Rational Planning of Construction Site Resources

Planning for construction site resources in landscape engineering civil construction management should be implemented from three aspects: personnel, materials, and equipment. In personnel management, the required number of different types of workers should be accurately calculated based on the project schedule. A scientific and reasonable performance appraisal system should be established, linking work results with compensation mechanisms, and providing timely recognition and material rewards to outstanding teams and individuals. In material management, a detailed material demand plan should be prepared according to the construction schedule, specifying the types, specifications, and quantities of materials needed at different stages. Long-term cooperative relationships with high-quality suppliers should be established in advance to ensure timely and stable material supply. Incoming materials must undergo strict quality inspection to prevent substandard materials from entering the construction site [1]. Materials prone to moisture or damage should be stored in dedicated warehouses with moisture-proof, fire-proof, and theft-proof measures. In terms of equipment planning, suitable construction equipment should be selected based on the characteristics and requirements of the landscape project, ensuring good performance and sufficient quantity. A daily equipment maintenance management system should be established, with regular inspections, repairs, and maintenance to keep the equipment in good operating condition from start to finish, reducing downtime caused by equipment failures. Equipment operation time and sequence should be reasonably scheduled to avoid idleness and overuse, improving equipment utilization efficiency. Additionally, the construction site itself is the most valuable space resource. The construction unit should reasonably divide the site into work areas, material storage areas, and processing areas. Information technologies like BIM can be used for site layout simulation, and the interspersion of non-critical tasks should be reasonably arranged to indirectly save the occupancy time of all resources.

3.2 Implementing Whole-Process Quality Control

Implementing whole-process quality control in landscape engineering civil construction management is key to ensuring engineering quality and realizing design intent. Before construction, a professional and experienced management team should be assembled, with clear responsibility scopes for quality control among team members to ensure orderly quality management work. The construction unit should strictly review the qualifications of the construction team and personnel's work certificates, ensuring workers possess the corresponding skill levels. Incoming raw materials, components, and equipment must undergo strict inspection and sampling re-inspection as required, preventing substandard materials from entering the site. Based on project characteristics and requirements, detailed and targeted construction schemes should be prepared, clarifying quality objectives and control measures to provide scientific guidance for construction. During the civil construction phase, on-site supervision and process control must be strengthened. Quality control points should be set for key processes and special procedures, with dedicated personnel assigned for standing supervision to ensure construction quality meets requirements. Regular quality inspections and hidden danger investigations should be conducted. For identified quality issues, rectification notices should be issued promptly, and follow-up should be done until problems are completely resolved. Handover inspections between processes must be implemented effectively, ensuring

quality is maintained throughout the sequence. On this basis, attention should be paid to the impact of the construction environment on quality, taking corresponding protective measures according to weather changes, such as drainage and concrete curing. During construction, GPS measuring instruments can be used to ensure the accuracy of positioning and setting out, and drones can be used for earthwork quantity calculation, achieving digitalized and visual process management. After construction, completed civil works should be subjected to actual measurement, visual inspection, and functional testing according to design and code requirements, ensuring all indicators meet acceptance standards. After final acceptance and before overall project delivery, the construction unit should formulate and implement finished product protection measures to avoid pollution or damage to completed civil surfaces, features, etc., by subsequent construction operations. Complete quality records and acceptance documents should be retained throughout the construction process, forming a complete quality traceability file. After the landscape project concludes, a quality review meeting should be organized promptly to summarize successful experiences and shortcomings, providing a reference basis for improvement in future projects.

3.3 Promoting the Application of Digital Technology

Civil construction management in landscape engineering should actively promote the application of digital technology. Project management must deeply recognize the transformative role of digital technology in civil construction management and incorporate it into corporate strategic planning. Construction units should regularly organize training for managers and workers on digital technologies, learning application skills for cutting-edge technologies like BIM, GIS, and drone surveying. Regularly inviting industry experts for lectures and case sharing allows employees to intuitively feel the efficiency improvements brought by digitalization. On this basis, construction units should leverage the advantages of digital technology to build a comprehensive digital management platform. Using BIM technology to create 3D models can fully display the layout, structure, and details of the landscape civil engineering, identifying design conflicts and construction difficulties in advance. Construction units should utilize the advantages of GIS technology to comprehensively organize geographic information data, providing accurate basis for site planning and earthwork balance calculation. Promoting the application of digitalization in civil construction management requires increased investment in digital equipment. Introducing drones can quickly obtain panoramic images of the construction site, promptly identifying violations and safety hazards. Equipping mobile terminal devices enables construction personnel to access the digital management platform anytime, anywhere, achieving real-time information sharing and collaborative work [2]. During construction management, a clear digital strategy blueprint should be formulated, defining application goals and implementation paths to avoid blind investment. Initially, pilot applications of digital technology can be chosen for a single key project or specific process, with gradual roll-out to all projects after success.

3.4 Building a Safety Risk Prevention and Control System

Civil construction management in landscape engineering should build a comprehensive safety defense and risk control system. Establish a safety management leadership group with the project manager at its core, clarify the safety responsibilities of managers at all levels and construction teams, sign safety responsibility letters, and decompose safety responsibilities down to individuals. Before construction, professionals should be organized to conduct detailed site surveys, identifying safety risks such as earth collapse, falls from height, and mechanical injuries. Use scientific methods to assess risks and formulate targeted prevention and control measures for different risk levels. Within the construction unit, regular safety education and training should be organized for

workers. Through case analysis, on-site demonstrations, etc., improve workers' safety awareness and operational skills. At the landscape engineering construction site, daily safety inspections should be conducted, with key monitoring of temporary electricity, scaffolding, construction machinery, and other critical areas and links to ensure compliance with safety codes. For high-risk works like deep foundation pits and high-formwork, professional instruments should be used to real-time monitor data such as displacement and settlement. Upon detecting abnormal data, warnings should be issued promptly, and emergency plans activated. All results of safety hazard investigations and accident lessons must be completely recorded, forming a complete PDCA closed loop to continuously optimize the risk control system and ensure intrinsic safety throughout the construction process.

4. Analysis of Paving Technologies in Landscape Engineering

4.1 Stone Paving Technology

Stone paving technology is a key link in creating beautiful landscape environments, and its craftsmanship directly affects the overall quality and user experience of the landscape. During the construction preparation stage, stones must be carefully selected. Check the stone specifications, dimensions, and textures according to design requirements, ensuring no flaws like cracks or missing corners. The base course must be meticulously cleared of debris, ensuring its strength and stability. A certain thickness of concrete should be poured as a cushion layer, providing a solid foundation for stone paving [3]. The setting-out work during stone paving is very important. Technical personnel should precisely snap control lines and edge lines according to the design pattern, determining the placement position and sequence of the stones. Before formal laying, the stones should be dry-laid on the ground to adjust gap sizes and the overall layout for the best visual effect. Grouting or sweeping of joints can only be done 1-2 days after stone paving is completed. For tight joints, special grout or cement paste is commonly used for filling and compaction. For natural seams like ice crack patterns, fine sand or cement dry mix is often swept into the joints, followed by watering for settlement. After paving, the surface should be cleaned promptly, and measures like watering for curing and covering with soil should be taken. During the curing period, vehicle traffic or severe impact is prohibited.

4.2 Colored Concrete Stamping Technology

Colored concrete stamping technology in landscape engineering has unique artistic expression and practical advantages. This technology uses Portland cement or ordinary Portland cement as the base material, mixed with wear-resistant aggregates and special additives. Through on-site pouring and mold stamping processes, it can form diverse texture patterns on the concrete surface, such as imitation stone, wood, or brick. In practical application, the base course is first treated to ensure compacted plain soil, a level and dense crushed stone cushion, and concrete cushion, providing stable support for the surface layer. Then, concrete with a strength grade above C25 is poured, with the slump controlled within 95mm. After full compaction with a plate vibrator, a steel roller is used for rolling and slurry raising to eliminate surface pores and sand/stone. Once the concrete strength meets the standard, dust should be removed by water washing, and a double polyurethane sealer should be sprayed to form a transparent protective layer resistant to UV rays, acids, and alkalis.

4.3 Permeable Brick Paving Technology

Permeable brick paving technology is a core element in constructing ecological sponge garden paths. Its construction must follow the principles of base course reinforcement and permeability

continuity. In the base course treatment, a composite structure of graded crushed stone and permeable concrete should be chosen. Before construction, the compaction degree of the soil base should be tested, ensuring it is above 93%, with a drainage slope of 1% set. In the setting-out and positioning stage, lines should be snapped according to the design pattern to ensure the smoothness of the paving lines. Herringbone or stack bond patterns are recommended for pedestrian paths within the landscape. Interlocking paving should be used for vehicle roads to enhance overall stability. The selected permeable bricks must possess high compressive strength. After construction completion, permeability tests and flatness inspections must be conducted.

After paving is completed, preliminary cleaning should be done immediately. A layer of medium-fine sand should be spread on the brick surface and swept into the joints with a broom until the gaps are fully filled. This step locks the bricks in place and enhances overall stability. In the final step, a small vibratory roller or plate compactor should be used to gently compact the entire surface, ensuring all bricks are completely level and in place. After all processes are completed, the site should be thoroughly cleaned, removing excess sand material.

4.4 Wood Decking Technology

Wood decking technology in landscape engineering adds a warm atmosphere to garden spaces with its natural, rustic texture and soft visual effect [4]. This technology often selects wood with strong decay resistance. Among them, Mongolian Scotch Pine (Pinus sylvestris var. mongolica) is moderately priced and can adapt well to outdoor environments after preservative treatment. Merbau (Intsia spp.) possesses strong durability and stability, offering excellent long-term performance. Before construction, ground debris must be cleared, and the soil compacted to provide stable support for the wood decking. During installation, a moisture barrier membrane should be laid to prevent underground moisture from eroding the wood. Meanwhile, the spacing of wood joists is generally controlled at 30-50cm, adjusted according to wood specifications and design requirements. After installation is completed, wood chips and dirt should be removed immediately. Even for preservative-treated wood, special wood paint or oil should be applied to enhance its moisture resistance, UV resistance, and wear resistance, highlight the natural wood grain, and enrich the landscape effect. Furthermore, during later maintenance, regular inspections should check for loose fasteners and signs of wood decay, ensuring the landscape project always maintains its optimal appearance.

5. Conclusion

In summary, civil construction management and paving technology in landscape engineering jointly promote the high-quality progress of projects. Strengthening civil construction management is the foundation for rational personnel allocation and material management, while paving technology can also meet the diverse aesthetic demands people place on landscape engineering. With technological advancement, requirements for the ecological environment are becoming higher. In landscape engineering project construction, attention should be paid to construction site resource planning, whole-process quality control should be strengthened, the application of digital technology should be promoted, and a comprehensive safety risk prevention and control system should be built, thereby creating comfortable and pleasant green landscape spaces.

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.