

# Analysis on the Management and Technical Aspects of Asphalt Pavement Construction

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**Abstract:** The continuous acceleration of urban construction and the quality of highway construction projects has received an extensive attention, predominantly on asphalt pavement construction. Therefore, it is necessary to establish a high-quality supervision, good management and technical operation as well as maintenance control mechanism in conjunction with the construction environment to ensure a success on road construction to be carried out smoothly and be able to achieve an advance level in the optimization goal of asphalt pavement construction management. This paper focuses on the technical points and management points of asphalt pavement construction, aiming to provide more intuitive data for the construction management department to improve the overall quality of asphalt pavement construction.

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## 1 Introduction

Asphalt plays an important role in the process of constructing roads. The safety of asphalt pavement construction supervision mechanism can be the basis to enhance road safety by improving the maintenance and the level of maintaining as well as a laying foundation for the overall progress of the quality control mechanism.

## 2 Key points of asphalt pavement construction technology

### 2.1 Paving in asphalt pavement construction

During the process of constructing asphalt pavement, the paving machine is largely used to complete the paving treatment of asphalt mixture. In order to improve the timeliness of the specific work effectively, it should be taken thoughtfully that it is necessary to establish a sound and effective construction plan which can ensure that the design drawings of the project can be met and the operation efficiency of the paver is stipulated and constrained in combination with the actual application requirements and the paving project. In results to that, the width and thickness of the road surface plus the quality of the asphalt mixture are well defined. Finally, the most important matter to take into consideration is to ensure that the specific parameters of the asphalt surface layer can meet the technical requirements<sup>[1]</sup>.

In addition, it is fundamental to acknowledge that once the actual operating speed of the paving technology is set, it is not allowed to be changed at any time. This requires a relevant construction management department to supervise the technical operation in order to strengthen the efficiency of the paving degree and the paving speed control. Firstly, it is necessary to minimize the manual intervention in the paving process, improve the actual application effect and paving speed as well as ensure that the management process can be strengthened<sup>[2]</sup>. Moreover, to manage the steel wire in the paving process, the twisting type is generally adopted. The diameter of the paving wire is controlled

within a range of 6mm, and the distance between the spacing of the wire bracket design is generally set at 5m. Next, ensure that the pressure energy is higher than 800N and maintain the integrity and timeliness of the overall paving process. Lastly, this can help to achieve the comprehensive level of management procedures and provide guarantee for the overall progress of the special road segment processing procedures<sup>[3]</sup>.

## 2.2 Roller compaction in asphalt pavement construction

The roller compaction construction technology plays an important role in the process of asphalt pavement construction. It is the technical point closely related to the construction quality. The construction department are suggested to supervise the technical operation requirements and technical norms by using the road roller to upgrade the specific operation management level according to the standardization requirements. Therefore, it provides guarantee for the comprehensive progress of asphalt pavement compaction quality control work<sup>[4]</sup>. During the technical operation process, the running speed of the compactor are required to be supervised and the compaction quality of the asphalt pavement should be improved rationally to ensure that the uniform speed can be controlled within the standard range, thereby reducing the porosity problem occurring during the construction process.



Figure 1. Pneumatic Tire Roller

Finally, the most important matter to be taken into

consideration is the crushing process. The crushing process should be able to judge and analyze the speed of the compactor and the numbers of crushing, effectively avoiding the influence the efficiency of mutual constraints on the actual management. Therefore, in order to integrate the rolling quality, it is necessary to correlate with the rolling process. The parameter mode is systematically constrained. As an example, it is necessary to carry out rolling with a tire roller as shown in Figure 1 and to control the speed of the roller within the standard range.

## 2.3 Technology in joint construction and compaction

In order to improve the overall level and application quality of the pavement in asphalt road pavement construction, it is compulsory to supervise the pavement construction to ensure the impact of compaction work would be able to improve the efficiency of the function and management as well as improve the pavement pressure. The actual treatment process reduces the gap problem of the asphalt pavement, therefore ensures the compacting effect of the asphalt pavement can integrates the durability of the road pavement and lays a foundation for a smooth development of the highway management work as well as effectively prolongs the service life of the asphalt pavement<sup>[5]</sup>.

One of the most common problems faced during asphalt pavement construction are longitudinal construction joints and horizontal construction joints. Therefore, it is compulsory to use two pavers to cooperate for longitudinal construction joints, which will effectively establish a sound and complete supervision operation management mechanism to ensure equipment can play a role on its time value in a specific work. Moreover, a corresponding position can only be reserved for sufficient compaction to reduce the overlapping of the paving layers typically for road sections that have been finished paved with asphalt mixture. This is to ensure that the rationality of the rolling and foundation laying work as well as avoiding gap problem during the elimination work. Only then, it is possible for the basis to correspond when the road sections that have been finished paving the asphalt mixture. Finally, for horizontal construction joints, it is a compulsory to use a flat seam treatment process to improve the specific construction control requirements<sup>[6]</sup>.

### 3 Key points in asphalt pavement construction management

In asphalt pavement construction management, it is obligatory to establish a sound and coordinated supervision and control mode based on practical problems. This is to optimize specific problems in managing efficiently as we all to integrate the comprehensive value of the management model, and to lay the foundation for the overall progress of the follow-up supervision level<sup>[3]</sup>.

**Table 1.** Specifications of natural sand in asphalt pavement mixture

Specifications	Percentage of mass through different sizes of mesh					
	9.5 mm	4.75 mm	2.36 mm	1.18 mm	0.6 mm	0.3 mm
Fine sand	100%	90 — 100%	85 — 100%	75 — 100%	60 — 84%	14 — 45%
Medium sand	100%	90 — 100%	75 — 100%	50 — 90%	30 — 50%	8 — 30%
Coarse sand	100%	90 — 100%	65 — 100%	35 — 65%	15 — 30%	5 — 20%

**Table 2.** Technical requirements for coarse aggregate of asphalt mixture

Soft stone content	Water absorption rate	Compress value	Relative density	Elongated particles	Asphalt adhesion
5%	Below 3%	Below 30%	Above 2.45 t/m <sup>3</sup>	Above 20%	Level 3 or higher

**Table 3.** Asphalt mixture grading

Types of gradation	Percentage of Mass Through Different Sizes of Mesh					
	9.5 mm	4.75 mm	2.36 mm	1.18 mm	0.6 mm	0.3 mm
Medium grain asphalt concrete	68 — 85%	38 — 68%	24 — 50%	15 — 38%	10 — 28%	7 — 20%

In addition, the Marshall asphalt specification index of the mixture is also exceptionally important. It is necessary to control the number of compaction of the surface mixture throughout 50 times on both sides to ensure the porosity can be between 3% and 5%. Plus, this would allow the asphalt saturation to set be set between 70% and 85%, the overall stability is above 5 and the flow value is controlled from 2mm to 4.5mm. Finally, only by fundamentally improving the material supervision level of asphalt mixture, management efficiency can be optimized<sup>[7]</sup>.

Moreover, the construction department are required to conduct a comprehensive analysis on the quality of the raw materials and the design process of the mix before the construction begins to ensure the stability and uniformity of the mixing as well as understanding basic parameters such as the temperature in mixing, factory and the rolling. When required, it is compulsory to improve the proportion management by means of the test project. Reasons to add on is that this can rationally improve the basic level of quantitative

### 3.1 Integrating asphalt parameters

The quality of asphalt is the key to construction management in asphalt pavement construction projects. Relevant personnel are suggested to combine the technical requirements and standard parameters in order to make specific judgments on specific data. The asphalt pavement mixture of natural sand specifications is as shown in Table 1. Aggregate technical requirements for coarse sands are shown in Table 2 and asphalt mixture grading are very critical parameter requirements as shown in Table 3.

analysis, effectively reduce the porosity and improve the compaction effect as well as effectively meet the safety requirements for the adhesive quality during the application of the asphalt mixture. Therefore, this ultimately improves the comprehensive standard of asphalt pavement construction management<sup>[8]</sup>.

### 3.2 Improving construction site management

There are essentials points to take in considerate in order to effectively improve the comprehensive level of asphalt pavement construction management. Firstly, it is compulsory for management to supervise and manage the source of materials and effectively improve the basic level of management work. Then, it is also crucial to improve the supervision mechanism in order to ensure that specific problems can be restrained and therefore improve the rationality of the control process. Effective site management would eventually lay a solid foundation for a smooth development of road construction with a quality supervision<sup>[9]</sup>. Moreover, the most significant matter is to integrate special supervisors, combine the key points of raw

material management and rationally analyze the quality, quantity and ex-factory requirements of materials to ensure that the material supervision and management department can improve the quality management work in accordance with specific requirements. Lastly, it can carry out centralized restraint management on the corresponding documents such as the entry permit, separate and retreat the problematic construction materials to ensure that the unqualified materials will not flow into the site and improve their overall quality and stability<sup>[10]</sup>.

### 3.3 Integrated equipment management mechanism

One of the essential matter to take note in order to maintain the construction management level of asphalt pavement would be the equipment supervision mechanism and control process. Relevant departments are required to actively establish the equipment quality supervision and inspection structure by maintaining the working status of the components therefore to ensure that the mechanical management process and the mechanical supervision system can meet the construction project on actual demand. Lastly, in equipment management control system, it is necessary to improve the regular maintenance management mechanism and the stability of the equipment, integrate the road pavement construction quality as well as improve the asphalt pavement construction management level. Therefore, with this effective equipment management control system, the goal to achieve the project's sustainable development would not be neglected.

## 4 Conclusion

As a conclusion in the construction management of asphalt pavement, it is compulsory to integrate technical points as well as actively establish and improve the complete constraint control mechanism to ensure a comprehensive and efficient construction

process and management mode; predominantly the supervision of construction equipment for material quality and maintain the quality control of asphalt construction. Finally, it is the role of the management level to ensure the quality and efficiency of a highway asphalt construction efficiency as well as improves the comprehensive effect of asphalt pavement construction management and technical supervision.

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