

Research on Construction Technology of Municipal Road and Bridge Asphalt Pavement

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Abstract: *At present, in the construction of municipal roads and bridges, asphalt concrete pavement is very common. Asphalt concrete pavement has excellent impermeability and crack resistance, and is not prone to cracks in engineering construction. Moreover, the construction is rapid, highly meeting people's needs for road comfort and convenience. To effectively ensure the construction quality of municipal road and bridge asphalt pavement, it is necessary to accurately and comprehensively grasp the construction technology to ensure the safety of road traffic.*

Keywords: municipal roads and bridges; Asphalt pavement; Construction technology quality.

1. INTRODUCTION

In the construction of road and bridge projects, asphalt pavement is an important construction content. The asphalt pavement has a high degree of comfort when opened to traffic, a relatively flat road surface, simple maintenance, and a short construction period, with outstanding advantages. In the construction of road and bridge pavements, asphalt pavement is widely used. Asphalt is an organic cementitious material, mainly composed of non-metallic derivatives and hydrocarbons. It is black brown and mainly has waterproof, moisture-proof, anti-corrosion, solid, liquid, and semi-solid methods. It is a relatively mature road and bridge material. At this stage, many municipal road and bridge areas have been affected by factors such as overloaded vehicles and non-standard maintenance for a long time, resulting in varying degrees of damage to the asphalt pavement of the road and bridge. Therefore, we should pay attention to the construction technology and quality control of the asphalt pavement, strengthen the quality control at the construction stage, comprehensively improve the stability of the construction pavement, and improve the construction quality of the road and bridge [1].

In the construction of municipal road and bridge engineering, asphalt pavement is an important part, and its quality directly affects the construction effect of road and bridge engineering, which is related to the safety of the road and bridge. Therefore, in the construction of municipal road and bridge projects, it is necessary to pay more attention to the quality of asphalt pavement construction, take reasonable measures to improve the quality of asphalt pavement and enhance its bearing capacity. At the same time, asphalt pavement construction management should also be done well to extend the service life of roads and bridges and improve construction value. In addition, in road and bridge construction, due to the influence of the chemical and physical properties of asphalt materials, coupled with the complexity of the environment in which the construction is carried out, there are many factors that affect the quality of the project. If early preparation and material control are not done well, it will pose a threat to the construction quality, extend the construction period, and increase capital costs. Moreover, municipal roads and bridges need to withstand the passage of many large and medium-sized vehicles, and the effect of high load pressure will bring varying degrees of damage to the pavement. Therefore, it is necessary to strengthen construction management and control, and reasonably select pavement construction technology to ensure the stability of road and bridge structures and driving safety [2], taking into account various problems that may occur.

2. COMMON PROBLEMS WITH ASPHALT PAVEMENT IN ROAD AND BRIDGE ENGINEERING

In the report of the 20th Party Congress, General Secretary Xi Jinping emphasized, "Deeply implement the strategy of revitalizing the country through science and education, the strategy of strengthening the country through talents, and the strategy of innovation-driven development, open up new fields and new tracks of development, and continuously shape new dynamics and new advantages in development." At the same time, The 14th Five-Year Plan calls for green development to be reflected in all areas and aspects of economic and social development and for accelerating the promotion of green and low-carbon development. Green development is an important part of China's high-quality economic development, and the improvement of green technology innovation is indispensable

for realizing the transformation of the economy to green development. Green technological innovation is becoming an important game field of global scientific and technological competition and a new round of industrial revolution. Under the background of carbon peak and carbon neutrality, the development of traditional industries and emerging industries can not be separated from the improvement of the development level of green technological innovation.

With the rapid development of big data, the Internet of Things, artificial intelligence and other digital technologies, digital general technology based on a new generation of information technology has increasingly become an important driving force for promoting green economic development, and the all-round integration of big data with all fields of the economy and society has shown an irresistible trend. To this end, in September 2015, the State Council on the issuance of the Circular on the Outline of Action for Promoting the Development of Big Data proposed to "promote the construction of comprehensive pilot zones for big data in Guizhou and other areas". The following year, in February 2016, Guizhou was approved to build the first national-level comprehensive pilot zone for big data, and in October of the same year, Beijing, Tianjin, Hebei, Inner Mongolia, Shenyang, Henan, Shanghai, Chongqing, and Guangdong were awarded the second batch of pilot construction of pilot zones. The implementation of the big data comprehensive pilot zone policy provides a unique "quasi-natural experiment" for the study of green technological innovation. Existing studies have mainly focused on the digital economy [1], industrial structure [2], and theoretical assessment [3], but there is very little literature on the green innovation effect of the policy. How do pilot zones affect green technological innovation? Does the impact of pilot zones on green technological innovation vary across cities? In the critical period of China's vigorously practicing scientific and technological innovation, green and low carbon, how to scientifically answer the above questions is of great significance to comprehensively understand the impact of the construction and development of pilot zones on green technological innovation, and to reveal the environmental effects of green innovation.

2.1 Oil Flooding Occurred

During the use of asphalt concrete, it is very vulnerable to the impact of weather changes, which will lead to the situation of oil bleeding on the pavement. This situation will make the asphalt pavement very smooth, and the friction is insufficient. When the vehicle runs on such a pavement, it is difficult to control the speed, which is very likely to cause traffic accidents and endanger people's personal safety. In addition, if there is oil leakage on the asphalt pavement, combined with rainy days, it can lead to horizontal infiltration into the interior of the asphalt concrete, causing deformation of the internal structure and affecting the adhesion and firmness of the ore, thereby exacerbating the damage to the asphalt pavement. There are also many reasons for the occurrence of oil leakage on asphalt pavement, such as the amount of asphalt not meeting construction requirements, problems with the proportion of concrete, and the overall structure being affected, resulting in oil leakage; Or, during the formation of the surface layer, due to the negligence of construction personnel in management, the aggregate loss is severe, resulting in a thin asphalt layer, which leads to the occurrence of oil leakage on the road surface.

2.2 Cracks appear

After long-term use, different cracks may appear on the asphalt pavement, mainly due to the construction unit not purchasing according to the national asphalt selection standards when selecting the type of asphalt, or using asphalt processed by small refineries in pursuit of greater economic benefits. Moreover, many construction companies do not strictly follow the construction plan and specific requirements in the actual construction of road and bridge projects, Therefore, the probability of cracks appearing on asphalt pavement has become higher. When asphalt pavement is put into use after construction is completed, cracks are generally relatively mild. However, over time, the road surface is overloaded with load, which increases the width and length of cracks, and weather and environmental factors can also affect the asphalt pavement.

2.3 Improper paving method

In the process of road and bridge engineering construction, the paving of asphalt is also very important, directly determining the smoothness of the asphalt pavement. Therefore, it is necessary to pay attention to the paving method of asphalt in order to better play the role and value of asphalt pavement in the road and bridge process. However, in the actual construction process, some construction personnel did not strictly follow the relevant regulations and were using mechanical equipment.

When laying, the equipment usage guidelines were not followed, resulting in various problems in the laying of

asphalt pavement, which not only affects the subsequent work process, but also hinders the long-term development of highway bridge construction. In addition, when using the paver, due to the lack of relevant technical operations, unstable operation may also occur, resulting in insufficient bearing load for asphalt pavement, making it difficult to achieve effective engineering quality, and thus affecting subsequent use.

2.4 Segregation of asphalt concrete

The imbalance of mixture properties such as asphalt content, additive content, gradation composition, and pavement porosity is the main reason for asphalt pavement segregation. The early damage of asphalt pavement, such as uneven structural depth, multiple transverse cracks, local oil leakage or rutting, is directly related to the segregation of asphalt mixture. The segregation of asphalt concrete mainly includes temperature segregation and density segregation. The main reason for temperature segregation is the temperature difference and uneven mixing of the mixture at different positions during transportation and laying of asphalt pavement. The main reason for density segregation is the aggregation of large diameter particles caused by mechanical vibration during the mixing of concrete mixtures, which fails to meet the relevant requirements and affects the smoothness of the engineering road surface.

2.5 Inadequate selection of construction season

During the construction process of asphalt concrete, both asphalt and concrete materials are highly susceptible to temperature changes. Therefore, it is necessary to pay attention to the changes in temperature on site during construction to avoid the difficulty of effectively carrying out asphalt pavement construction due to excessive temperature difference, thereby affecting the overall project progress. For example, during winter construction, the temperature of asphalt mixture will decrease relatively quickly, while the viscosity will increase, which makes it difficult to ensure the compaction effect during the compaction process of the road surface and affects the quality of the project; During summer construction, not only will it face high temperatures, but it will also face prolonged rainfall. Road and bridge engineering is a long cycle project. If construction is carried out in the rain for a long time, it will not only increase the moisture content of the aggregate, affect its adhesion, but also lead to a decrease in local temperature of the asphalt pavement, which is prone to cracking.

3. OPTIMIZATION MEASURES FOR QUALITY CONTROL OF MUNICIPAL ASPHALT PAVEMENT CONSTRUCTION

The boosting effect of big data development on green technology innovation is mainly reflected in the following three aspects: at the micro level, the establishment of a comprehensive pilot zone for big data promotes the transformation of enterprises from the traditional factor-driven and investment-driven to innovation-driven, and the "information silo" and "data barriers" is gradually broken, and the increasingly accelerated iterative upgrading of technology as well as the requirements for sustainable development jointly push enterprises to continuously improve their green R&D capabilities to cope with external competition [4]. At the Medium level, the establishment of a comprehensive pilot zone for big data has led to the emergence of new models and new business models, and the convergence and fusion of data resources and industries has led to a new leap in social productivity, and traditional industrial production and manufacturing has been given a new impetus, which further revolutionizes the development mode of traditional industries and improves the level of green technological innovation [5]. At the macro level, big data promote the economy to realize green development through resource integration, scientific decision-making, environmental monitoring and other means, and promote the level of green technological innovation [6].

3.1 The compacted density should meet the standard requirements

The compaction density has a direct impact on the bearing capacity and smoothness of asphalt pavement in road and bridge engineering. So in practical operations, it is necessary to scientifically test and analyze the compaction density to ensure that the parameters comply with the requirements of the specifications, in order to improve the quality of asphalt pavement construction. In the compaction density testing, it is necessary to compare and analyze the proportion of coarse and fine aggregates with other materials, understand the performance characteristics of the mixed asphalt material, and then judge whether the bearing capacity and strength of this type of asphalt mixture can meet the requirements in application based on the construction level of municipal road and bridge engineering and the existing national specifications. If it meets the standards, it can be used directly. If it does not meet the standards, the problem needs to be identified and the mixture proportion needs to be adjusted. If necessary, the

performance indicators can be determined through block testing to determine whether the compactness standard is correct. During compaction construction, real-time understanding and mastery of road surface changes should be carried out to achieve scientific adjustments and increase compaction density.

Immediately stop the compaction work after meeting the indicator requirements to avoid damaging the structural quality. During the compaction process, two pavers are usually selected to operate simultaneously. Construction personnel should scientifically control the spacing between pavers to avoid the danger caused by repeated rolling. At the same time, control the speed and temperature of the paver to avoid problems of loose or lost slurry.

3.2 Pay attention to construction details

The key technology for the details of asphalt pavement construction is the treatment of pavement joints, and the presence of pavement cracks has a significant impact on the safety and integrity of the pavement. The joint treatment technology is divided into transverse joints and longitudinal joints. The main function of horizontal joints is to ensure the driving performance of the road surface. During the operation process, it is necessary to ensure the rationality of the construction. Generally, the horizontal joints mainly deal with the lead hammer surface at the end of the paving belt, then pick out the coarse gravel in the gaps, shovel out the scattered gravel, and then roll the road surface to ensure the smoothness of the road surface; Longitudinal joints can be divided into two types: hot joints and cold joints. Cold joint treatment requires the use of joint compaction technology, which involves rolling through a moving longitudinal joint at a distance of 30 meters from the edge of the paving strip. Hot joint technology does not require a distance from the edge of the tape Rolling is carried out at a distance of 30 meters, but together with adjacent rolling strips to improve joint efficiency.

3.3 Control the quality of construction materials

Before organizing asphalt pavement construction activities, attention should be paid to the quality control of construction materials, mainly including asphalt materials, machine made sand, stone chips, mineral powder, etc. The quality of materials should be inspected to comprehensively improve the overall quality of materials used. In the selection of various construction materials, attention should be paid to ensuring that the quality of construction materials meets the basic requirements of construction, and material costs should be analyzed to control construction procurement costs based on comprehensive improvement of construction quality. In material selection, asphalt raw materials and various construction Applied Materials shall be purchased from regular manufacturers, and professionals shall be organized to inspect the quality of Applied Materials before construction [3-4]. To prevent the use of substandard materials in construction, it is necessary to conduct material sampling inspections and comprehensively improve the overall quality of the materials used.

3.4 Strengthen the supervision of construction operations

The supervision and management of highway asphalt pavement construction to a certain extent determine the construction efficiency and quality of highway asphalt pavement, and their supervision and management work play an irreplaceable binding role. Therefore, the Chinese government needs to establish a specialized regulatory department to continuously increase the supervision of highway asphalt pavement construction. At the same time, the regulatory department should fulfill its job responsibilities, adopt a serious and responsible attitude towards the supervision and management of highway asphalt pavement construction, and give certain rewards to construction units with good quality of highway asphalt pavement, We will impose strict punishment on construction units with poor quality asphalt pavement on highways, in order to fully leverage the regulatory role of supervision and management departments and promote further improvement of the construction quality level of asphalt pavement on highways.

3.5 Conduct post maintenance and upkeep

The completion of municipal road and bridge engineering construction does not necessarily mean the completion of the entire work. Construction personnel also need to do a good job in later maintenance and repair work to reduce the occurrence of disease problems, optimize the construction quality of asphalt pavement, extend the service life of roads and bridges, and maintain the safety of the pavement. In the later stage of maintenance and repair, it is necessary to arrange a dedicated person to handle it, pay attention to real-time supervision and control of road surface quality. Once problems are found, the cause should be immediately identified and reasonable solutions should be provided to avoid the problem from expanding. In addition, daily maintenance work is also

essential, which requires staff to develop a comprehensive plan and allocate personnel reasonably to ensure the smooth progress of daily maintenance work and reduce the occurrence of disease problems. For road maintenance work, construction personnel should carry out planning and processing based on the actual situation to optimize the comprehensive performance of the road surface.

4. CONCLUSION

In summary, during the construction process of municipal road and bridge asphalt pavement, it is necessary to Select appropriate paving and rolling equipment based on the basic situation of the construction site, and determine the rolling frequency and pressure based on the trial paving to ensure the construction quality of asphalt pavement and improve the durability of municipal road and bridge asphalt pavement. The establishment of National Big Data Comprehensive Pilot Zone is an important driver for promoting green technology innovation. Therefore, based on the panel data of 282 prefecture-level cities in China from 2013 to 2020, this paper utilizes the National Big Data Comprehensive Pilot Zone as a quasi-natural experiment, and uses the double-difference method to explore how it affects green technological innovation. The study outcomes show that the establishment of the pilot zone can effectively improve the level of green technology innovation, which still holds after the robustness test; Mechanism tests have shown that the construction of pilot zones improves green technological innovation mainly by promoting the development of the digital economy; The findings of the heterogeneity analysis show that the construction of the pilot area exhibits significant differences for cities in different zones. This paper reveals the role of comprehensive pilot zones of big data in promoting green technological innovation, enriches the research literature in related fields, and sheds light on the subsequent implementation of comprehensive pilot zones of big data, especially on the realization of green and low-carbon development in various regions.

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