



Identification, causes and prevention measures of daily maintenance diseases of highway asphalt pavement

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Abstract In the construction of highway engineering projects in China, asphalt pavement has been widely used. The transportation construction department should regularly carry out maintenance inspections, take scientific means to analyze the diseases in daily maintenance, and make reasonable formulation of maintenance strategies to ensure the overall quality and use effect of asphalt pavement. In order to better improve the overall quality of highway projects, to provide a good infrastructure environment for the healthy development of China's transportation industry. In this paper, the diseases in the daily maintenance of highway asphalt pavement are analyzed, the corresponding causes are discussed, and the corresponding construction suggestions are proposed.

Keywords highway; asphalt pavement maintenance; road diseases; identification

1. Introduction

Asphalt pavement performance is stable, vehicle driving safety, and in some high-grade highway application has achieved good results. Affected by the environment and other factors, asphalt pavement often appears disease problems, affecting the safety and comfort of vehicle driving. The disease will gradually expand if it cannot be solved timely and properly, which will lead to the decrease of the service life of the highway. The traffic construction department should improve the attention to asphalt pavement diseases, detailed analysis of the main causes of various diseases, in advance to develop a variety of disease treatment solutions, find problems in a timely manner, to ensure the traffic safety of asphalt pavement, better for economic development services.

2. Identification method of diseases in the daily maintenance of highway asphalt pavement

2.1 Identification method of block crack, transverse crack and longitudinal crack

Transverse crack is a kind of crack close to the center line of the road. In some cases, a small number of branch cracks may appear. It can be divided into severe crack and mild crack according to the damage of the crack edge and the width of the crack. Massive cracks are mainly caused by the intersection of transverse cracks and longitudinal cracks, resulting in the splitting of the pavement into multiple large-scale massive structures. They can be divided into two types: heavy and light according to the actual width and block degree. The longitudinal crack belongs to a single crack, which is parallel to the center line of the road. Some longitudinal cracks are accompanied by a small number of branch joints. They are divided into two types: severe and mild according to the damage situation and width.



2.2 Identification method of cracks and pits

Cracking belongs to a common crack situation of asphalt pavement, which mainly shows that small grid cracks are interlaced with each other. And the shape is similar to the tortoise shell stripe. They can be divided into mild, moderate and moderate conditions according to the deformation, width and size of cracks. Pits are caused by other diseases that can't be treated in time. Some fine surface materials will be taken away when vehicles drive through loose and cracked areas, resulting in the appearance of the pit.

2.3 Identification methods of looseness and subsidence

Looseness is the damage to the pavement caused by the loss of asphalt binders and aggregate particles that are constantly evolving from the surface of the highway to the interior of the highway. And it is usually divided into mild and severe according to the severity of the damage. Subsidence is a local location depression on the surface of the highway, the size is usually more than 10mm, which belongs to the structural damage of the asphalt pavement of the highway. And it can be divided into mild and severe according to the impact on the formation of comfort and the degree of subsidence.

2.4 Identification method of ruts, oil, and wavy bags

The asphalt of the asphalt pavement mixture migrates upwards to form an asphalt film with a certain luster, which is an oily situation. Wave bale is a relatively large disease of the quality of asphalt pavement, mainly due to the fact that the surface of the highway has a certain regular longitudinal undulation caused by the movement of surface materials, and the trough and peak distance are relatively close. Ruts are longitudinal depressions formed along the wheel marks on the surface of the asphalt pavement, with a size of more than 10mm, which can be divided into two cases: heavy and mild.

3. Causes of the disease

3.1 Design aspects

The structural design of the pavement is unreasonable in the early design process, and the unreasonable determination of the type of relevant mixture is a cause of various diseases. The asphalt pavement needs to have certain anti-seepage ability on the basis of meeting the traffic demand of vehicles according to the relevant technical specifications. Attention should be paid to the guarantee of the anti-seepage ability of the asphalt pavement layer in the selection of relevant surface layer combinations. And the mixture with small porosity and particle size should be selected as much as possible to ensure that the anti-seepage ability is effectively guaranteed. In order to better guarantee the impermeability, the lower seal layer shall be added in the design to ensure the waterproof ability of the asphalt pavement. Designers lack effective investigation on the geological conditions around the construction area and only rely on experience in the process of design, which is easy to make mistakes. And the feasibility of relevant design can't be effectively guaranteed. In order to complete the design task as soon as possible, some designers gave the pile number and thickness and other parameters of the outlet section only based on the approximate estimation, and did not conduct scientific calculation for the deflection value, which led to great influence on the strength of the pavement itself in the later period, thus causing serious disease problems. The thickness design of pavement is also a very easy problem in the early design. Some design units mainly determine the axle number by dividing the traffic volume to reduce the design volume, and take the equivalent axle number within the design period as the design basis of the pavement structure thickness through conversion. However, in the actual road operation, the axle load of the vehicle is easily different from the design situation. Various overload behaviors have a higher impact on the pavement, which leads to the shortening of the service life of the pavement.



3.2 Construction

Problems in pavement construction are the direct problems leading to diseases. Scientific and reasonable construction management can provide more convenient conditions for daily maintenance and reduce the occurrence of various quality diseases. In the course of surface course construction, if the construction technicians can't strictly control and inspect the quality of asphalt materials, and the mixing ratio control effect is poor, it will lead to a variety of diseases such as looseness, packing, pit, exposure and displacement during the use of asphalt pavement. The relevant construction equipment can't meet the construction requirements, and the mixing of the mixture is not uniform, which affects the flatness and compaction of the pavement. It will also affect the pavement strength if the temperature control is not standard enough in the process of mixture heating, and then have a negative impact on the compaction process, resulting in micro cracks. The base course will be affected by water flow if the surface of pavement and base course is not removed in advance in the process of base course construction, and the surface of asphalt surface course will be affected accordingly. The compaction effect of the base course will be directly affected by the mixture proportion during the base course construction. The overall compactness will be affected if the proportion of coarse aggregate is too high. Even if the compactness reaches 100%, it is difficult to guarantee the compaction effect. In the daily maintenance work, the maintenance work lacks a scientific maintenance plan, and the understanding of the specific conditions of the pavement is not accurate, and there is a lack of sufficient test detection. The relevant technicians didn't communicate with the designers in time during the preliminary design of the pavement, and the relevant construction schemes were not thoroughly studied and understood. The technical level of some construction teams and construction personnel is limited. In order to pursue the construction period and low cost, the construction cannot be carried out in strict accordance with the relevant technical standards and specifications during the construction process, and the quality management and technical management work during the construction are not carried out in depth.

4. Measures to prevent and control diseases of asphalt pavements on highways

4.1 Ensure the quality of raw materials and optimize the design scheme

Improving the quality of raw materials plays an important role in the prevention and treatment of highway asphalt pavement diseases. It is necessary to ensure that the materials have wax content, low anti-aging performance, high and low temperature and high viscosity when selecting materials. The modifier can be added to the asphalt appropriately to improve the basic performance of the asphalt according to the actual situation of the project, and the proportion of materials can be determined according to the climate and traffic conditions of the region to ensure the quality of raw materials. In the design process of asphalt pavement, it is necessary to comprehensively consider various factors, improve the professional ability of designers, select design units with certain ability and reputation, and effectively predict the traffic change trend in the design process. Reasonably determine the structural thickness of asphalt pavement, select the dense pavement structure, ensure the effectiveness of the design scheme, and reduce the impact of objective factors on the pavement.

4.2 Prevention and control of diseases

According to the main characteristics of each crack, asphalt with outstanding relaxation performance is selected as the pavement material to ensure that the stability of the material can meet the basic requirements of construction, ensure the structural stability of the lower bearing layer in the early stage of construction, and use the surface material with high penetration to ensure the quality of the project. Ensure that the construction technology meets the national standards, the compactness meets the design requirements, and reduce the rutting rate. According to the loose condition of the pavement, slaked lime, cement, quicklime and other materials can be added to the pavement stones to ensure the cohesion and thickness of the materials and improve the project



quality. After the completion of construction, strengthen the maintenance, timely find out various diseases, take appropriate measures to deal with them, take corrective maintenance measures for some severely damaged sections, cooperate with preventive maintenance, and improve the safety and service life of the road.

5. Conclusion

In recent years, with the increase in road traffic, especially the increase in heavy-duty vehicles, road diseases have become increasingly significant. Different forms of damage have different effects on the performance of highway use. Therefore, the investigation of highway damage is an important part of the assessment of the technical status of the highway, and it is also an important basis for formulating maintenance countermeasures. In order to make road damage investigation operational and practical, the understanding of road damage categories is particularly important and deserves high attention in road maintenance.

References

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