

Study on Construction Technology of Subgrade and Pavement in Settlement Section of Tourist Highway in Taihang Mountains

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Abstract: In the context of rural revitalization, the development of tourism throughout China has been paid attention to, tourism is also an important way to develop rural revitalization, with greater economic value. Therefore, our country pays more attention to the construction of tourist highway, which plays a great role in promoting the development of road infrastructure in rural areas. Because of our country's vast territory, numerous provinces, complex geographical features and surface environment, therefore, in the highway construction, we need to combine with the actual situation, to overcome the settlement section roadbed and pavement construction technical problems, based on the analysis of the geographical features of Taihang Mountains and the complicated surface roadbed, the feasible countermeasures and solutions are put forward according to the highway construction horizon and the actual situation.

1. Introduction

In view of the development in recent years, our country has higher and higher requirements for highway construction, and pays more attention to the safety and practicability of highway itself. In the perspective of rural revitalization, many rural areas of China began to attach importance to the development of tourism, tourism route planning in various areas, but also to promote the construction of tourism roads. However, many tourist routes are located in rural areas, and some of them have complex topography. Therefore, it is necessary to pay attention to the quality of road construction and improve the ability to deal with the settlement of roadbed on the complicated surface of different highways. The construction of tourism routes is an important basis for promoting the development of tourism and an important path for rural revitalization. Therefore, it is necessary to pay attention to the quality improvement of tourist highway construction, and the construction technology of subgrade and pavement in settlement section is also the key point to be grasped. Only in this way can the quality of tourism highway construction be effectively guaranteed, and can provide help for the follow-up development.

From the existing development point of view, our country has carried on the certain research to the settlement section roadbed pavement construction technology, some scholars thought that carries on the settlement roadbed pavement construction relative system, moreover the specialty is extremely strong, therefore, from design to follow-up construction are relatively complex, any one of the road construction problems, it is easy to lead to road construction direct repair, but also need to pay more human and material resources. If there are some unscientific steps during the actual construction, it is easy to cause the settlement of the road surface, in this case, it will affect the safety of road use. This paper discusses the construction technology of the subgrade and pavement of the settlement section in the construction of the tourist highway in Taihang Mountains, and analyzes the construction situation of the main line of Taihang No. 1 tourist highway, this part of the highway construction mainly includes: Zhuning to Sunshine Section, the starting point and the Ching Shih line K 6 + 208 connected, via chuankou village, Heyu village, Daofo Ditch, Dian Shang, the Great Wall and other villages, at the end of the line, which is 12.656 km long, the road ends at the Sungzhan and Dongyu line. From the analysis of the construction of this section of the road, it can be seen that the road construction and surface environment of the road are complex, especially,

the soft and wet soil is the main part of the roadbed, which makes the roadbed construction very difficult.

2. Analysis of the Present Situation of the Settlement of Subgrade and Pavement in Taihang Mountains

The project is located in the heavy hilly area of Mocha Mountain in Taihang Mountains Province. There are numerous hills and ravines with a maximum height difference of 68 meters. As a result, the entire road section is not level. The section from Zhuning to sunshine is occupied. The starting point is at K6 + 208 of the Ching Shih line, it passes through Chuankou village, Heyu Village, Daofugou village, Dianshang village, Great Wall village and so on. It ends at Sungzhan and Dongyu line. The total length of the route is 12.656 kilometers. The topography of this section of the road is relatively complicated, often construction of about 60-70 meters, it is necessary to replace a construction method, which brings greater challenges to the settlement of the subgrade. And the first is the stability of the Earth after the construction of the key, for this reason, the project department of all the mountain road construction methods are used. Project manager Meng Xinqi recalled the construction scene at that time still fresh in his mind. Roadbed and pavement constitute an important part of the highway, a solid roadbed is a solid foundation of the road surface. Practice has proved that the roadbed quality will directly affect the final quality of the whole highway. Pavement strength and stability are determined by subgrade strength and stability^[1]. In the process of road construction, often encountered in the soft and wet soil construction. We must take different measures to deal with the problem of wet soil so as to improve the quality of road construction. In the actual construction process, the construction personnel first clean up the mountain, for the soft soil foundation which does not meet the requirements, needs to carry on the original ground replacement treatment, after carrying on the replacement, need to use point ramming, full ramming to ensure that the foundation firm, and then formal fill. When filling, the method of layered filling is adopted. Every 30 cm is filled by six different processes of rolling once, and every layer of filling is tested once for the bad settlement of subgrade, at the same time, every three meters is recompensed by dynamic compaction, if the ground is a wall or other earthquake-resistant structures, the use of hydraulic ramming construction, the highest mountain filled a total of 21.1 meters.

3. Influencing Factors of Construction Technology of Subgrade and Pavement in Settlement Section

3.1 Construction Factors

For the construction of Taihang Mountains's tourist highway, it needs to pass through many special geological areas, such as soft soil area, expansive soil area and so on, these special areas can be used as the settlement of the lower end, if the part is not handled properly, it is easy to appear a variety of roadbed and pavement quality problems, such as roadbed cracking problems, slope east China, etc. , even prone to road collapse, these are easy to affect the normal use of highways, People's daily travel brings a series of safety hazards. In the process of expressway construction, we need to pay attention to the quality control of each link, through standardized construction management, to ensure the overall effect of construction, as well as the specific quality. In the actual construction, many construction teams lack rationality for the highway design scheme, do not pay attention to the overall effect of the whole scheme, and for individual design links, lack of more in-depth and detailed analysis and lack of effective quality control of key construction links have resulted in the actual construction, there is a big gap between the construction personnel's operation and design scheme and the actual construction requirement^[2]. For example: in the process of actual construction, and in accordance with the scheme involved in the selection of the most suitable construction materials, and do not have a reasonable control of the foundation water content and other factors. In addition, in the process of settlement observation, it is also found that the technical

treatment strategy itself is not reasonable enough, so that the problem of roadbed settlement has not been effectively solved.

3.2 Material Quality Factor

In the process of the actual construction of the expressway project, most of the settlement reasons are due to the quality of construction materials^[3]. In this, the construction personnel need to pay more attention to the preparatory work, must pay attention to the construction raw material quality effective control, through the more strict quality monitoring system, timely discovery of the construction process of the material quality problems. Before the formal construction, the construction team needs to combine the actual situation of the project site, select more suitable types of raw materials, and combined with the actual needs of the project construction, raw material quality for useful testing, to ensure that during actual construction all of the raw materials meet the standards set by the state and maximize the value of the raw materials themselves, to meet the basic needs of the actual construction of highway engineering^[4]. Considering the whole process of expressway construction at present, some construction enterprises do not combine the actual situation of construction site, environment and other factors when they choose the construction method, it is difficult to find out the quality problem of the packing material in time in the actual construction process because of the lack of relatively strict test for the selected materials. Regarding the purchase of raw materials, we did not pay attention to the market research work in the early stage, and for the comparison and analysis of the comprehensive properties of the filling materials, we also lacked the special test work, in the actual construction process, often because of the performance of raw materials itself is not up to standard, resulting in the problem of settlement of roadbed and pavement. In addition, in the link of filling and rolling of subgrade fillings, some of the constructors have obvious problems of improper operation, and have not carried out systematic operation in strict accordance with corresponding requirements and norms, as a result, the moisture content of the filling is not up to the standard, which leads to the settlement of the roadbed and pavement.

3.3 Design Factors

In addition to some natural factors, there are also some factors that cause the settlement problem during the construction of the expressway, which are mainly manifested in the unreasonable design scheme^[5]. For the Taihang Mountains Tourism Highway project preparation stage, the relevant staff will need to carry out a systematic survey of the actual situation on the site and design specific plans according to the actual situation, including the overall planning, construction technology and other parts. Prior to this, the relevant design units need to form a relatively professional team to the scene of hydrology, geology and a series of natural conditions, and related data for systematic collation and analysis, therefore, it is easy to analyze the main factors leading to the settlement of subgrade and pavement in the follow-up construction, and to formulate practical solutions to these problems, lay a foundation for the quality improvement of the follow-up project. In the process of actual construction, most of the design units, because of the lack of attention to the early on-site investigation work, resulting in many of the design content and the actual situation on-site problems, therefore causes the roadbed settlement and so on the question.

3.4 Hydrologic and Climatic Factors

During the construction of the tourist highway in Taihang Mountains, hydrological and climatic change is an important factor that causes the settlement of roadbed and pavement, it is easy to cause the project to have different degrees of settlement^[6]. For example: in this section, the motive temperature is very low, the moisture in the lower soil is easy to agglomerate upward, if the roadbed cover itself thickness is insufficient, then it is easy to form ice in the roadbed interior; Then, after the temperature rises in spring, the ice will melt, which will lead to a significant increase in the moisture content of the roadbed, causing a certain impact on the stability of the base structure, thus leading to settlement problems.

4. Construction Technology of Subgrade and Pavement in Settlement Section of Highway

4.1 Preparation for Construction

4.1.1 Filling Construction

During the construction of the tourist highway in Taihang Mountains, the whole subgrade filling process is divided into the stages of preparation, construction and renovation, need to strengthen the various links of the fine control, mainly divided into filling, leveling, rolling, testing these parts, in this process, it is necessary to comprehensively consider the factors influencing the construction of each part, such as preparation work, base treatment, etc.

4.1.2 Measuring Lofting

After running through the entire Central line of the Taihang Mountains tourist highway, the corresponding surveyors need to combine the Central line position with the rational setting of side piles, which can use the white ash or some other measures, clearly mark the route of side piles. After the surface of the roadbed is cleaned up, it needs to be checked systematically, and after the surface compactness exceeds 90% , the center pile can be restored and the boundary line can be let out, use white ash or paint to mark out the middle line directly, and use it as the main reference for the thickness of fill in the construction process.

4.1.3 Material Requirements

It is necessary to select the most suitable raw materials for high-quality roadbed engineering, which is also the key to effectively control the settlement of soft soil section of Taihang Mountains tourist highway. Therefore, in the choice of subgrade filling, we should pay attention to the following problems:

(1) when the height of subgrade is less than 20m, it is necessary to use kaishan stone slag to fill it, and control its particle size to 2/3 of the thickness of the whole filling layer.

(2) in order to avoid the settlement of embankment and the crack of pavement structure, it is necessary to install geogrid in the part of roadbed according to the code, which can promote the bearing capacity of roadbed effectively, in order to prevent the whole roadbed uneven settlement and a series of problems.

(3) a series of measures such as blind ditch and rock filling can be taken to achieve the main target of the settlement problem in order to more effectively link the influence brought by the current settlement problem. Among them, blind ditch is mainly to remove the groundwater in the foundation one by one, which can promote the stability of the foundation structure effectively; In order to ensure the stability of the slope, the construction of the drainage layer generally plays the role of promoting drainage consolidation, thereby alleviating the whole water caused by a series of settlement problems; The main purpose of installing geogrid is to prevent the crack of pavement structure caused by subgrade settlement.

4.1.4 Preparation for Filling

Staff need a more comprehensive understanding of the geological conditions within the scope of the construction before the formal construction of the fill, with special emphasis on some special foundations ^[7] . If it is just an ordinary ground, just need to the surface impurities, water and other direct clean up, and dry it flat, will be more than 1:2.5 aspect ratio of the excavation into the width of more than 2 m steps, finally, you can use the road roller to roll the ground level, up to 90% of the compactness can be.

4.2 Foundation Treatment and Material Spreading, Rolling

The use of machinery to clean up the surface soil and vegetation and other impurities, and then can use artificial means, the secondary fine cleaning, if there are trees in the construction site, it would need to be felled by hand, and the roots of its trees could be produced directly by mechanical equipment, and finally its impurities could be transported out of the field by transport equipment, and all the garbage in each other in a fixed location, directly disposed of is not suitable for waste

backfilling; for some low-lying and special sections of the road, such as paddy fields, it is necessary to do a good job of basic drainage, stasis removal, and the necessary rolling treatment, before the formal construction, the need to effectively control the degree of compaction of the ground, usually need to control at more than 90%^[8].

4.3 Mixing and Transportation of Materials

In order to fully ensure that the amount of Tarmac used and the heating temperature, etc. can meet the basic requirements of the design, the heating temperature of the Tarmac material needs to be strictly controlled to ensure that after mixing, its uniformity can meet the actual needs of engineering construction, to prevent problems such as uneven mixing. For Tarmac transport, vehicles with a load exceeding 15t need to be cleaned more thoroughly and the rear cover covered before the mixture is formally transported, after the asphalt mixture is loaded, it needs to be covered with thick canvas to prevent temperature loss.

5. Conclusion

Due to the relatively small strength of soft soil roadbed, it will have an impact on road construction. If we do not pay attention to strengthening the roadbed during construction, it will probably lead to road surface collapse or deformation, causing major construction problems, and may lead to major traffic accidents. In order to strengthen the research on the construction of tourist roads in Taihang Mountains, we must study the settlement of the road surface on the soft soil subgrade, which requires systematic construction in strict accordance with the corresponding construction requirements and technical standards, in order to meet the requirements of tourist routes.

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