

Analysis of Asphalt Pavement Cracks at High Altitude Area

Xiaokang Yao

College of Civil Engineering, Chongqing Jiaotong University, Chongqing 400074, China

Abstract

Based on the universal law of climatic conditions and high elevation mountain of asphalt pavement cracks, analyzes the causes of the high altitude mountain asphalt pavement cracks and stated that its preventive measures.

Keywords

High altitude mountain, asphalt pavement, cracks.

1. Introduction

The development of the national economy, our country in recent decades to carry out large-scale transport infrastructure, in high traffic situation on the road pavement performance put forward higher requirements. High elevation mountain area weather, so reducing the semi-rigid strength, difficult to form a plate structure, cracking semi-rigid base is gradually reflected to the asphalt surface, causing the road overall carrying capacity and resistance to deformation decrease, seriously affecting the performance road and service life. Therefore, the causes of cracks in asphalt pavement of high altitude for analysis has great significance for its construction and maintenance.

2. High Elevation Mountain Area Cracks in Asphalt Pavement type and Causes

High altitude mountain climate conditions are very complex performance in temperature, extreme low temperatures, strong ultraviolet radiation, asphalt pavement cracking have complex effects, mainly composed of the following aspects.

2.1 Temperature Crack

Temperature Crack is the main form of High Altitude Area asphalt pavement cracking damage. Due to High Altitude Area large temperature difference between day and night, strong ultraviolet radiation, fast asphalt rate of aging. Sudden drop in temperature will cause the temperature of the asphalt pavement contraction, in general due to the asphalt better stress relaxation performance. When the temperature dips asphalt temperature stress is small, but the poor performance of the deformation of asphalt mixture asphalt at high altitudes caused by aging, so the temperature stress is large. When the temperature stress exceeds the tensile strength of the asphalt mixture will have a temperature crack. Temperature cracks are often generated by the asphalt road surface, and to the next development. Temperature cracks appear, not only undermine the integrity of the asphalt pavement and aesthetics, and the temperature of the water through cracks into the roadbed inside, so to soften the roadbed, carrying capacity decreased, thereby enabling the asphalt pavement of subsidence, causing cracking, asphalt pavement significantly reduce the use of performance, quality and service life of the road by the extremely unfavorable.

2.2 Reflection Crack

As China's most Pavement Base selected semi - rigid base. While the semi - rigid base having a high strength can improve the carrying capacity of the road, the road to reduce the amount of material, project cost savings and other advantages, but there are also semi - rigid base defects and deficiencies of their own difficult to overcome. semi - rigid base of strength and stiffness, due to the shrinkage and temperature cracking easy to form a having a certain width and spacing of the plate, but also due to the large bending stress and resilient modulus of the module, and therefore reduces the subgrade soil the top surface of the vertical stress. Shrinkage cracks and cracks in semi - rigid base temperature gradually spread upward, gradually reflected to the asphalt pavement, led to the emergence of

reflective cracking. When rainfall occurs, rain water infiltration through cracks reflection, gathering between the surface layer and the base layer, when the vehicle load, the erosion caused by water on the grass-roots, grass-roots appear Pumping phenomenon, squirt mud asphalt surface layer and the semi-rigid layer adhesive force between the decrease in vehicle load accelerated the destruction of asphalt pavement structure.

2.3 Fatigue Crack

Fatigue cracking is one of the common asphalt pavement cracks. Fatigue cracks are bottom-up pass, when the bottom layers of asphalt tensile strain is greater than the ultimate tensile strain, the fatigue failure asphalt pavement. The main cause of high altitude fatigue cracks in the asphalt pavement for two reasons: First, when the degree of compaction of the grass-roots construction is not enough, not even forming, causing fatigue cracks; the second is the strength of road base is too large, the layer of asphalt paving before grassroots Pat severe cracking, repeated use of the process in action vehicle loads, such cracks gradually extended up until the asphalt surface.

2.4 Frost Heaving Crack

Seasonal Frost of High Altitude Area temperature is very low, so that water freezing in the subgrade embankment expands. Since the hydration effect changes in the permeability of water embankment, when the ice melts in spring, making the roadbed subgrade frost heaving and crack propagation to the asphalt pavement, and its large width, depth deep. Such cracks in the pavement and the shoulder of the junction of the most common, is a kind of edge cracks.

3. Prevention of High Elevation Mountain Area Asphalt Pavement Crack

3.1 Raw Material Selection

Rational use of bituminous materials: High-altitude penetration, low temperature ductility, low viscosity greater bituminous material should be used. When the asphalt material should be at a high temperature to ensure the performance of the premise, there is a greater deformation. Further, with the temperature sensitivity of small, low elongation and good performance, good stress relaxation properties of bituminous material can effectively reduce the impact of temperature on cracking. Minimize stable inorganic binder material shrinkage properties and crack resistance, reducing the possibility of semi - rigid base cracks and reflective cracking appears to contain from the source.

3.2 Design of the Asphalt Pavement Structure

Suitably increasing the thickness of the asphalt surface layer, a flexible base, or between the semi - rigid base asphalt and gravel layer is disposed graded buffer layer can reduce the temperature cracks. Selection of impermeable dense-graded asphalt as a road surface, or the choice of friction coefficient, rough grass roots can reduce temperature cracking.

3.3 Construction Control

Full crushing and reasonable arrangements for the construction process can reduce the temperature of the asphalt pavement cracking. Do joint processing, to avoid cold joints. Good drainage and the use of permeable material preferably filling roadbed is useful. In the quarter, more severe or frozen silt sections can also use coarse sand or slag and other water-permeable paving material permeable barrier layer to prevent frost heaving, to prevent the emergence of frost heaving cracks. Reasonable construction, strict control of the degree of compaction, reasonable arrangements for the construction process, to avoid cross-interference between the construction process and eliminate pollution asphalt layer is necessary as well.

4. Conclusion

Due to the year round temperature is low, the temperature difference between day and night, strong ultraviolet radiation, asphalt pavement at High Altitude Area will appear temperature crack, reflection cracks, fatigue cracks and frost heaving cracks and other forms of cracks. Cracks greatly undermined the performance of the road, seriously shorten the life of the road. It was analyzed for high altitude

asphalt pavement crack phenomenon that caused many reasons pavement cracking. Choose a reasonable preventive measures of asphalt pavement crack to prevent in high altitude areas.

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