The Application of Three-Dimensional Integrated Protection Technology in High Slope Control of Mountainous Highway

Jun Han

Sichuan Guangba Expressway limited liability company, Guangyuan, Sichuan, 628000, China

Abstract: In the process of China's national economy construction, the role of highway traffic is unquestionable. And with the continuous development of society and the continuous improvement of highway grade, the work of the highway slope governance become a top priority, especially for some mountainous area highway, strengthen management of slope is very critical. The emergence of three-dimensional comprehensive protection technology has created great convenience for the management of the slope of the mountainous highway, and the safety of the mountain highway has been improved effectively. In view of this, the paper focuses on the application of three-dimensional integrated protection technology in the treatment of highway high slope in mountainous areas for reference and reference.

Keywords: Stereo synthesis; Protection technology; Mountain roads; Slope control; Apply

Corresponding Author: Jun Han, 751039300@qq.com

1. Introduction

In some mountainous area highway construction in China, due to the limitation of terrain, make the digging depth of fill is deep and this cause serious influence to the safety of the highway, easy to cause a series of slope hazards, which to some extent, hindered the effective of the national economy level ascension.[1] In order to effectively strengthen highway safety, especially the mountainous area highway, highway construction related departments need to use the advanced equipment and technology, reasonable slope management, effectively reduce the slope diseases are caused by accidents, thus effectively improve the safety and reliability of the mountainous area highway.

2. Overview of 3D Comprehensive Protection Technology

In the construction of some mountainous roads in China, it is difficult to reinforce the slope because of the influence of the terrain. In order to effectively reduce the risk of slope decline, slope reinforcement is usually used in mountain highway construction. Relatively than the other way, anti-slide pile in construction process not only has the characteristics of simple operation, and it is also the safety and reliability of the relatively high, so has been widely applied in the mountainous area highway construction. But due to the mountainous area highway unique terrain and hydrological effect, often appear makes deep bedding rock slope, the emergence of the problem is usu-

ally transient, and falling fast, damage degree is higher, so the traditional slope supporting technology (such as bolting, anti-slide pile, etc.) is not well to control and prevention, so must adopt advanced supporting technology for slope management and prevention. Comprehensive slope protection technology is combined with a variety of supporting technology in the integration of technology, it can effectively prevent the formation of the slope slide diseases, reduce injuries caused by the decrease of slope, and the surrounding mountain highways the protection of the natural environment also has played a certain positive role. Therefore, the three-dimensional integrated protection technology has become one of the most widely used technologies in highway slope control in mountainous areas.[2]

3. The Application of Three-Dimensional Comprehensive Protection Technology in the Treatment of Highway High Slope in Mountainous Areas

Comprehensive slope protection technology is by far the most ideal treatment technology, in order to explore the three-dimensional integrated protection technology in the application of mountainous highway high slope governance, based on a governance mountainous area road side slope as an example, the main points in the application of comprehensive protective technology in-depth discussion and instructions, detailed as follows:

3.1 Project Overview

At the bottom of the slope of a mountainous highway, the surface of the surface of the residual silty clay and the slope of the slope is more than 50 meters, and the groundwater is deep.[3] The highest altitude difference in the region is 4,041 meters above sea level. It is mainly in the valley and mountainous terrain, with more lithology and severe fracture after weathering. The following is an in-depth study and analysis of the application of three-dimensional integrated protection technology in the slope control of the region, aiming to provide the following advice and help for the industry.

3.2 Application Point Analysis

3.2.1 Prepare for the Preliminary Work

First of all, before the highway slope in mountainous areas, need to be prepared for the following aspects: first, the analysis of the mountainous area highway elevation, completes the data record and statistics, as normal in order to lay a solid foundation for the subsequent slope; secondly, the surface of mountain highway slope is treated with loose soil, which is mainly for the preparation of the next measurement. Only when the above two points are prepared, can we ensure the further implementation of the three-dimensional comprehensive protection technology.[4]

3.2.2 Measuring Line

In the completion of preparatory work, to implement measuring unreeling process, the specific implementation process is as follows: first, need according to the requirements of design drawings on the basis of lofting processing, and with the aid of steel rule, effective excavation position for accurate positioning, so as to improve the accuracy of measurement. Second, for measuring unreeling procedures, once encounter arc structure, will need to measure related staff in accordance with the circular arc structure for center position, the effective analysis according to the center of the circle, so as to determine the specific location of pay-off.

3.2.3 Foundation Groove Excavation

In order to make the excavation depth more reasonable and standard in the process of excavating the slot, manual excavation is usually used instead of mechanical excavation.[5] In the excavation of the artificial foundation, it is necessary for the relevant personnel to have a good professional quality. According to the actual situation of the slope, the reasonable depth should be excavated, not too deep or too shallow.

3.2.4 Plant Protection

In the use of comprehensive governance in mountainous area road side slope protection technology, effectively for the surrounding plants need protection, this is the slope of governance requirements, detailed protection measures are as follows: first, the slow slope soil erosion caused by the.[6] In the process of highway slope control in mountainous areas, when the surrounding hydrology is not analyzed, the occurrence of soil erosion can be caused, causing serious damage to the surrounding plants, therefore, need to related staff in front of the slope governance on surrounding hydrological environment were analyzed, and combined with the conditions of surface runoff will function to minimize soil erosion, thus effectively protect the surrounding plants are not destroyed; second, avoid soil erosion. Wide spreading because of the mountainous area highway surrounding some of the plants, in the face of precipitation and vegetation root system to absorb moisture, in order to achieve stability of topsoil, so in the slope governance, relevant staff to reasonable vegetation, avoid water and soil erosion.

3.2.5 Prestressed Anchor Cable and Concrete Frame Girder Construction

In the construction of prestressed anchor cable, the basic

work of construction preparation and anchor hole drilling should be done in combination with anchor reinforcement, anchor hole grouting and concrete reinforcement work. Place the anchor hole on the slope to ensure the stability of the slope and adjust the anchor point. The application of drilling equipment, combined with the drilling rig, crushing rock structure, application and drilling technology, combined with the corresponding carrying capacity. Drilling emplacement process, completes the slope measurement work, install the rig, and fixed, adjustment, meet the requirements of normative drilling process, using the form of air drilling, analyzing the characteristics of the drill main performance, avoid drilling is in a state of distortion.[7] The actual drilling process needs to be combined with the change of strata, effectively deal with the cementing process of the solid wall, ensure the depth of the hole depth and the effectiveness of the anchor cable. The effectiveness of the anchor hole cleaning, need to deal with the combination of high pressure air, reduce cement mortar, combined with the hole wall rock mass basic bond strength, high pressure water to rinse the actual anchor hole inspection stage, the need to design the aperture, combined with the bit and the main form of standard pipe, analyze the practical situation of anchor hole as far as possible, install the anchor body. Straighter steel wire, control medium bracket, fixed outward winding engineering. Before cutting excavation, to drain water treatment, and in the process of anchor cable of the slope excavation, to adopt reasonable blasting methods, as far as possible the realization of the excavation of stratification and the layered anchor.

3.2.6 Construction of Stone Arch

Stone arch frame construction is a comprehensive protection technology is an important link in practical application, in the concrete construction, the related construction personnel combined with design drawings required for Central Line control, and shall, in accordance with the mountainous area highway elevation, do a good job, add the anti-slide pile finishing lofting processing.[8] In addition, in the governance of the highway slope in mountainous area, also need to do a good job, crumpling renovation is specific in accordance with the requirements of design drawings, optimized for slope rate, at the same time do a good job in layered construction to achieve the actual requirements of the stone arch frame construction, finally complete the management work of the highway slope in mountainous area.

4. Conclusion

To sum up, as the mountain economy level rises, it is becoming more and more demanding for highway safety in mountainous areas. In the construction of mountain highway, due to the influence of the topography and hydrological factors, the slope damage often occurs, which seriously affects the normal use of the highway. In order to effectively control the hazards of highway slope in mountainous areas, this paper introduces a kind of three-dimensional comprehensive protection technology, which is the most ideal support technology in highway slope control. Through the actual slope engineering geological environment and the analysis of the hydrological environment, the comprehensive protection technology in the application of the mountain slope points are detailed analysis, for our country mountain area highway safety and reliability of ascension to lay the foundation.

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