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Discussion on the Methods to Make the Military Highway Unimpeded in Plateau

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Abstract. This paper analyzed the types and feature of disaster which threatened the safety of military highway in plateau, and discussed the engineering methods to keep the military highway unimpeded from the disaster of mud-rock flow, landslide, sand-sliding, and damaged by flood, and the management methods.

1. Introduction

Most border areas on the plateau of China have an average altitude of more than 3, 500 m, cold climate, lack of oxygen along the route; sparsely populated areas, poor water transportation conditions, and railway and air only cover a small part of the region, and cannot form an integrated three-dimensional transportation system. The high and steep hills and steep, tortuous and dangerous military highways serve as a bridge and link between guard posts and troops. The only support for personnel transportation and material support is also an important basis for maintaining national security, an important prerequisite for realizing national military strategy, and an important link in transforming war potential into war strength. Therefore, strengthening the construction of military highways on the plateau and keeping them unobstructed play a vital role in enhancing the ability of border troops to cope with various security threats and accomplish diversified military tasks.

2. The Types, Causes and Characteristics of Disasters Affecting Border Military Highways

The particularity of the region where the plateau military highway lies leads to the fact that the quantity and quality of highway are seriously lower than the overall level of national highway. Most military highways are classified as off-road, with an average altitude of 3,500 m. Some need to climb over Snow Mountains above 5,000 m, and some need to travel through fast-flowing glaciers. A considerable part of the roads are ruts and natural roads on earth and stone, with few safety protection facilities and low ability to withstand natural disasters [1].Due to the complex and special natural conditions such as geological geomorphology, hydrology and climate, etc. along the military highways in the gaoyuan area, the disasters are not only of various types, but also widely distributed and frequent. The damages to the highways are easy to destroy and difficult to repair. The main types of disasters that directly threaten road traffic safety include debris flow, landslide, sand removal and water destruction.

2.1. Debris Flow Disaster [2]

Debris flow can be divided into glacier debris flow, rain - flood debris flow and glacier - rain - flood debris flow. Rain-flood debris flow is mainly debris flow induced by rainfall runoff, which is characterized by high occurrence frequency and high risk. The occurrence of debris flow is caused by intense erosion, mixing and transport of loose solid materials in valley slope caused by rainstorm runoff in summer. Glacier debris flow is formed by the hydrodynamic conditions of a large number of

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ice deposits and glacial lake outburst flood, glacier and snowmelt water. Glacier-rain flood debris flow is a hydrodynamic condition of glacier snow melt water and rainfall. The scale of disaster increases with the increase of catchment area.

2.2. Landslide

The landslide is widely distributed in the plateau area, which has the characteristics of serious road obstruction, difficulty and high cost. Usually, the larger landslide distribution is relatively concentrated in the cross compound of geological structure and the active canyon area of neotectonic movement. In tg-p due to early quaternary glacier accumulation formation of loose accumulation platform, poor stability, combined with rainfall, slope extremely easily, or in some loose, broken on both sides of the hill and valley under the fluvial erosion, leading edge collapse, the slope deformation and failure gradually development and form a series of landslide slope upward, in a highway landslide, the landslide sliding out direction is perpendicular to the line to more, directly to the slitting line, and landslide will occupy river, creating block and a serious threat to the downstream area road, personnel safety.

2.3. Sliding Sand

Sand sliding disaster is a process in which sand and gravel slide to the foot of slope under the action of gravity and accumulate in the foot of slope into cone slope. The material composition of sand-sliding breaking is mainly composed of grains of sand and mixed with gravel. When the slope is unstable, it reaches a new equilibrium state in the form of sand flow. Because of the continuous supply of sand grains, sand sliding activity has the characteristics of frequent activity, which seriously affects the safety of the highway passing the slope foot.

2.4. Water Damage

As the frontier defense military highway of the plateau moves towards the multi-along river and stream extension line, the roadbed, bridge and culvert foundation and bank protection of the highway have been washed and submerged by the summer flood for a long time, resulting in the damage of highway structures and the interruption of routes, which has a great impact on the military transport. Some sections of the sichuan-tibet line can reach a length of 220.8 m/km. The main causes of the water damage are as follows: first, due to topography, narrow river valley, easy to plug, large river longitudinal slope, river erosion on the bank slope serious erosion; The second is that some highway subgrade elevation is lower than flood level or the return water level formed due to debris flow, landslide and other obstructed river channels, resulting in road flooding. Flood water level, flow rate, flow rate, sand content and other changes in a large range, sudden outbreak, instantaneous flood volume, etc., are all difficulties to ensure the smooth flow of border military highways on the plateau.

3. Technical Methods for Prevention and Cure of Major Highway Diseases

3.1. Prevention Programs and Countermeasures of Debris Flow

For roads built in debris flow drainage area or debris flow hazard area, the following strategies can be adopted to prevent and control them. First, measures can be taken when selecting the route. Second, the use of Bridges, tunnels and other structures across serious disease zone, but the cost of building Bridges and tunnels is relatively high; In addition, construction of structures such as drainage, rectification and blockage are also engineering measures often adopted in response to debris flow disasters.

When determining the route direction for preventing and controlling debris flow on military highways, the intersection of roads and debris flow gullies should be controlled, various prevention and control measures should be compared technically and economically, and the most favorable plan should be selected, which will be reduced to the minimum, so that the debris flow can pass safely and guarantee the smoothness of military roads.

3.2. Prevention and Treatment of Landslide

Since the occurrence of landslide is mainly the movement of soil under gravity, the prevention and control of landslide should proceed from this fundamental reason. First is to avoid landslide, in the selection of road line, avoid landslide frequent location; The second is to control landslide, such as the line can not avoid landslide prone areas, must take control measures, mainly from two directions: improve anti-sliding force, reduce sliding force. The reinforcement method such as setting up supports, adding anti-slide pile, anchor and anchor cable can be adopted to improve the anti-sliding force. To reduce the sliding force, the methods of decompression and cutting of soil above the landslide can be adopted. Planting suitable vegetation on the slope, removing surface water and draining groundwater, and reducing human disturbance on the slope can enhance the anti-sliding force and reduce the sliding force. In addition, in highway operation, monitoring of landslide prone areas is an important means to prevent landslide.

3.3. Technical Measures and Countermeasures for Sand Slope Prevention

There is no unique treatment method for sand sliding disaster at home and abroad. Most of the methods are combined with landslide control and sand sliding control. Controlling sand source is the most fundamental way to control sand sliding, which is the most ideal and difficult to implement. Secondly, sand fixation can be adopted by planting vegetation and solidifying the surface of sand slope. The relatively direct and effective method is to use the route to avoid winding, or to build the sand discharge aqueduct, baffle wall, sand protection shelter and other sand discharge methods.

3.4. Preventive Measures against Water Damage [3]

The main purpose of the project is to protect the roadbed from erosion. According to the flow structure and mechanism, the protection of roadbed can be divided into direct protection and indirect protection. Direct protection is to strengthen the slope foot or foundation directly and improve its anti-scour ability. The main protective engineering measures include slope protection, retaining wall, retaining foundation, riprap, precast concrete, geotextile, stone cage, etc. Indirect protection is to construct the ding dam, along the dam and other projects or renovate the river course, change the flow structure of the river course, make the flow deviate from the protected river bank, pier or change the erosion section into the silt section, so as to achieve the purpose of protection. This kind of engineering encroaches on the river course, changes the river course flow greatly, has certain influence on the upstream and downstream even the opposite bank, accordingly these structures are also subjected to the strong scour of the water flow. Even if the dam end of the ding dam and the diversion dam is destroyed in the flood, the safety of the roadbed or bridge will not be immediately threatened. In fact, the protection purpose of the roadbed or bridge has been achieved, and it can be repaired after the flood season.

4. Management Means to Ensure the Smooth Military Highway of Border Defense on the Plateau

As a military road, use and management of the department in daily work, should be carefully in combination with the practical situation of sections of their jurisdiction, actively and effectively eliminate the factors of highway diseases, enhance the durability of highway facilities and the ability to resist natural disasters, in addition to the necessary engineering technology means, in the construction of highway management should also actively explore scientific and reasonable method.

4.1. Building a Good Military Highway is the Material Basis for Ensuring the Highway Unimpeded

The construction of military highway usually includes the planning, evaluation, decision-making, design, construction, completion acceptance, putting into production or delivery, etc., all the work must follow the sequence of work in the whole construction process, which cannot be reversed at will, but can be reasonably crossed. The national defense of the military highway on the plateau is of great significance. The special region, harsh natural environment and complicated links and procedures of the project construction must be paid close attention to all aspects of the project construction to ensure the maximum efficiency of the frontier military highway. Is a military road planning, road planning

must again after full investigation and research of decision-making, the line of line selection must meet countries, border guards and defense transportation under the major premise of optimizing circuit to avoid all kinds of natural disasters, according to the facts in can't avoid, also will do the least cross section. Secondly, the natural condition survey, the detailed investigation of the geological, hydrological and other natural conditions around the preliminarily planned route, is the most important basis for determining the technical means and methods of highway construction. Three is the construction process management, to determine the scientific and reasonable construction method, in construction process to design in strict accordance with the requirements of construction, can't let already facing all sorts of natural threats road add unnecessary human losses, at the same time, the construction of highway management and supervision of party must strict supervision, control of construction quality, for the plateau of the national defense highway traffic build quality.

4.2. Do Well in Daily Maintenance and Keep the Highway in the Best Condition

In order to maintain the best use status of military highways on the plateau and constantly improve the road rate, it is necessary to firmly set up the idea of "three-point construction and seven-point maintenance" and make unremitting efforts for daily maintenance. First, a scientific maintenance plan should be formulated. The maintenance amount of military highway in the plateau area is large, but the corresponding personnel is less, and the annual suitable maintenance time is short. Therefore, scientific and reasonable maintenance schedule, efficient use of maintenance power and adequate maintenance equipment are all necessary means to improve the maintenance efficiency. Second, the conservation measures should be seriously implemented, and then the scientific planning plan can only be fully implemented.3 it is to the rational use of maintenance funds, compared with the condition of local roads, military highway maintenance funds for plateau is lower, in the face of such situation, the financial support of border troops should actively strive for higher level units, at the same time its also want to improve their capital utilization, to ensure that all maintenance funds with maximum efficiency to use on the plateau military highway maintenance.

4.3. Strengthen the Capacity Building of Rapid Emergency Repair to Ensure the Timely Recovery of Damaged Highways

Although the border military highways that have been constructed and maintained to the maximum extent are unimpeded, road damage still occurs frequently in border areas of the plateau. In order to guarantee the needs of military transport in time of war and emergency, when roads are damaged by enemies or blocked or interrupted by natural disasters, they must be repaired in time. In order to ensure the smooth road recovery as soon as possible, first of all, it is necessary to establish the emergency repair team with strong business capacity, whose personnel have the relevant knowledge and technology of engineering, communication, transportation, repair, medical treatment, etc.; With a strong personnel team, it is also necessary to deploy complete emergency repair equipment and equipment that can meet the construction and operation requirements of the plateau region, as well as emergency personnel and equipment, and improve efficient emergency rescue and command schemes to enable people and things to do their best to ensure that damaged roads can be repaired as soon as possible.

4.4. Adhering to Military-Civilian Integration Development and Comprehensively Strengthening Military Highway Construction and Management

Military and civilian integration development is an important and long-term road for national defense transportation construction. For the construction and management of plateau military highways in difficult conditions, it is more important for the military and civilian to jointly build and manage them, and make use of civilian manpower and material resources to make up for their own deficiencies. Therefore, from the construction of border defense military highway in the plateau, to daily maintenance, emergency repair and access, can give play to the advantages of local forces; fully mobilize civil resources, so that civil resources can be added to the construction of national defense communications. For the joint construction and co-management of military highways on the plateau, sound laws and regulations and a reasonable civil resource compensation mechanism are the most

basic guarantee for safeguarding the rights and interests of both sides and mobilizing the enthusiasm of civil resources. However, there are still some deficiencies in the construction of laws and regulations on the civil transport capacity compensation mechanism in China. Therefore, strengthening the construction of laws and regulations in the border area of the plateau is also an important work to guarantee the smoothness of border military highways.

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