

# Common Diseases and Prevention Techniques of Highway Roadbed Engineering

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**Abstract:** *The key to the construction of highway subgrade engineering is to improve the stability and safety of the subgrade structure through scientific construction management methods, so as to continuously improve the overall construction effect. In the current stage of highway roadbed construction, many construction units have the problem of improper operation, which leads to the performance of the roadbed structure not meeting the requirements, resulting in different diseases and affecting the quality of construction. In the process of continuously increasing the scale of highway construction in China in recent years, various construction units will adopt diversified technologies to implement project construction content and improve the effectiveness of comprehensive construction management. When diseases occur in highway roadbed engineering, corresponding technical measures need to be actively taken to prevent and control them, ensuring that the various performance of highway roadbed engineering can meet expectations.*

**Keywords:** Highway subgrade engineering; Common diseases; Prevention and control technology.

## 1. INTRODUCTION

At present, the speed of social and economic development in China is constantly accelerating, providing significant opportunities for the development of various industries. In terms of the construction of highway subgrade engineering projects, some construction units lack consideration of the influencing factors of highway subgrade construction when organizing relevant construction management operations, resulting in disease problems and damaging the quality of engineering construction. When implementing disease prevention and control technologies, it is necessary to choose the most appropriate technical methods from a variety of technical forms, solve corresponding disease problems, increase the strength of highway embankments, and provide safe passage conditions for people. In the first stage (1978-1998), grain output surged from 300 million tons in 1978 to 512 million tons in 1998, indicating a consistent trend of rapid growth. The year 1978 marked the initiation of economic reforms and the 'open door' policy in China. Additionally, the implementation of the household contract responsibility system in agriculture effectively bolstered the enthusiasm of farmers. However, during this period, the country faced significant challenges in the form of natural disasters, including the severe drought in the north in 1980 and the flooding of the Liaohe River in 1985. These events led to notable reductions in grain production. In the second stage, 1999-2003, starting in 1999, China's grain output declined sharply, falling from 512 million tons to 431 million tons in 2003 in five consecutive years, a drop of 81.6 million tons, or as much as 5.9 percent. In order to change this situation and stabilize grain production, the government has continued to adopt policies to stimulate grain production and increase farmers' incentives to grow grain.

The organizational innovation atmosphere promotes the formation of innovation vitality within the enterprise, which in turn is conducive to the generation of employee innovation behavior. This paper combs the Chinese and English literature on the relationship between organizational innovation climate and employee innovation, first summarizes and sorts out the concepts of organizational innovation climate at home and abroad; secondly, summarizes the relationship between organizational innovation climate and employee innovation. This study is not only conducive to enriching the research on employee innovation, but also has strong guiding significance for companies to improve their employee innovation performance.

## 2. THE INFLUENCING FACTORS OF HIGHWAY ROADBED DISEASES

The term organizational climate comes from the concept of "cognitive map" proposed by Tomas (1926), which is an internal diagram formed by individuals to understand their surrounding environment, as an interpretation of the psychological environment. Shortly after the term organizational climate entered the research field, Lewin (1930) proposed the concept of group climate and defined it as the common perception of individuals within an organization or the "cognitive map" formed by individuals. the same or similar parts. In the 1950s, researchers formally used the term "organizational climate" (eg, Argyris, 1958; Fleishman, 1953). Forehand and Gilmer (1964)

believed that organizational climate has three characteristics: it can distinguish the organization from other organizations; it has relative persistence over time; it can affect the behavior of organizational members.

Schneider (1990) emphasized not only the individual's subjective perception factors, but also the organization's objective environmental factors, and on this basis, he defined organizational climate as the organization's employees' perceptions of practices, procedures, and behaviors that are expected, supported, and rewarded in the workplace. common sense. Currently, studies on organizational climate mostly adopt this definition (eg, Naumann & Bennett, 2000; Schulte, Ostroff, Shmul yian , & Kinicki, 2009). Researching the core dimensions contained in organizational climate is of great significance for promoting the study of organizational climate. Determining the dimension of organizational climate helps to concretize the research on the essence of organizational climate, and the psychological level of organizational climate can be used as a measurable concept. Schneider and Reichers ( Schneider & Reichers, 1983) also pointed out that " it is meaningless to study organizational climate by talking about the atmosphere in general without a clear reference." However, just like the uncertainty of the definition of organizational climate, for Dimensions of organizational climate also have a variety of conclusions . In the process of reviewing and synthesizing past research, Campbell ( 1970) and others found that all organizational climate scales contain four core dimensions: individual autonomy, the degree of structure to which individuals are assigned positions , Organizational reward orientation, understanding, care and support among colleagues.

Zhang Zhen, Ma Li, and Ma Wenjing (2002) believed that it should be reflected in organizational bureaucracy, innovation, and individual support; Pan Xiaofu (2002) defined it as a sound system, systematic management, interpersonal leadership, and leadership. Prestige, caring, and democratic style ; Zhao Xin (2011) believes that it should only include organizational support, leadership support, team support, and work support. In the existing research, scholars mainly deal with the research paradigm of organizational climate in three ways: organizational climate as an intermediary variable between two variables, organizational climate as an independent variable that affects other variables, and organizational climate as an independent variable that is affected by other variables. dependent variable.

One is the antecedent variable of organizational climate. Most of the research on the antecedent variables of organizational climate adopts the method of confirming the dimension of organizational climate and then compiling the measurement scale to verify it. It mainly focuses on the following aspects: Leadership behavior, leadership behavior style is an important factor affecting organizational climate. In his research on leadership styles, Lewin (1939) studied the organizational atmosphere formed by three different leadership styles: democratic, autocratic, and laissez-faire, and found that there is a significant correlation between leadership styles and organizational climate. Scholars in Taiwan, China are also conducting exploratory research on the relationship between leadership behavior, leadership style and organizational climate. Xie Huiqing (2001) and others believe that the leadership behavior, leadership style and organizational climate of leaders in an organization are closely related. Organizational characteristics, Payne (1978, 1971) found in his research that different departmental structures and different organizational level arrangements in the organization will have different effects on the organizational climate; In this paper, the impact of different organizational structures on the formation of different organizational climates is explored. Some later scholars, such as Dastmal (1986), studied the characteristics of the external environment of the organization, such as the uncertain competitiveness of the external market, and the different influences of the independence of the organization in the market on the organizational climate.

Second, the outcome variable of organizational climate, the research on the effect of organizational climate is a research hotspot in recent years. Scholars have realized that a good organizational climate in an organization has great influence on organizational performance, organizational output, individual job satisfaction, and professionalism. degree, participation, individual innovation, knowledge sharing, and so on. Organizational climate and individual attitudes. Research on individual attitudes mainly focuses on three aspects: individual engagement, individual satisfaction, and individual participation: organizational climate and individual engagement, organizational climate and individual participation, and organizational climate and individual participation. Satisfaction; Organizational climate and individual behavior. In the existing research, the research on the relationship between organizational climate and individual behavior mainly focuses on organizational climate and individual turnover rate, individual investment, knowledge sharing, organizational citizenship behavior, and individual innovation. Organizational climate and performance, the existing research on the relationship between organizational climate and performance can be summarized into three categories: main effect model, that is, organizational climate will have a direct impact on individual performance, and then impact on organizational performance, and there will be different correlations between organizational climate and organizational performance in different R&D stages. Denison (1996) and Kumara (1989) proved in their research

on university organizations that individual participation, administrative efficiency, task orientation, support for innovation, and degree of formalization in the organizational climate significantly affect university performance. Third, organizational climate may also act as a mediating variable. In early studies, organizational climate was often regarded by researchers as an explanatory intermediary variable between the external environment of the organization and the output of the organization. The organizational climate is . Lauer ( Lauer, 1994) believed in his research that organizational climate is a series of activities formed by the interaction between people and between people and organizations. There is a link between engagement and operational performance. (James 1974) ,believed in the study that organizational climate plays a mediating role between organizational operation and performance improvement rate, job promotion, and output . Guzzo ( Guzzo, 1976) pointed out that management practices affect organizational profits through the intermediary of organizational climate in his research on the conceptual model of the relationship between management practices and profits , and proposed that organizational climate can well predict changes in profits . Lin Meimei (1996) found that organizational climate plays a mediating role between leadership style and organizational commitment when studying the relationship between leadership style and organizational commitment.

Existing studies have shown that organizational climate can promote individuals to produce attitudes and behaviors that are beneficial to the organization, thereby generating innovation performance. When sorting out the existing literature, it is found that there are not many studies on the relationship between organizational incentives and individual innovation, but the relationship between the two can be judged from some related studies. Klein and Sorra ( 1996 ), the organizational atmosphere that is conducive to the occurrence of individual innovative behavior usually has three characteristics. Individuals implement innovative actions to provide actual or potential inducing factors. Third, while stimulating individual innovation, organizations will actively remove blocking factors for individual innovation through organizational systems, culture, and management. Amabil and Conti ( 1996) further defined the degree of organizational support for innovation perceived by individuals and in the process of completing tasks as organizational innovation climate, which covers organizational incentives for innovation, resources, pressure and factors that hinder innovation . The degree of removal, etc., the theoretical framework model of organizational climate related to innovation constructed by it, summarizes 5 organizational factors that affect individual innovation and 8 evaluation indicators of environmental perception.

Organizational innovation climate is shaped by organizational policies, processes, and incentives, and is the degree to which employees perceive the organization to support innovation. Amabile et al. showed that employees' perception of the work environment will affect the individual's intrinsic motivation, which will lead to differences in individual behavior. The shared cognition of innovation support formed by members of the organization is oriented to behavior. If employees feel that the organization provides the resources and assistance needed for innovation, they tend to produce innovative behavior. Some empirical studies have focused on the impact of organizational innovation climate on employee innovation behavior. The research of Isaksen and Akkermans believes that organizational innovation climate plays a mediating role between leadership behavior and employee innovation behavior, and organizational innovation climate has a positive impact on innovation behavior. The research of Lian Xin et al. also focuses on the intermediate mechanism of organizational innovation climate on innovation behavior. The empirical research results show that organizational innovation climate has a positive impact on innovation behavior.

## **2.1 Design plan**

Before organizing the construction of highway subgrade engineering, the construction unit needs to have the design unit plan the project and issue a feasible design plan to ensure that the quality of highway subgrade construction can meet the expected requirements. Some construction units lack attention to the design stage work during the implementation of highway subgrade construction operations, which increases the probability of disease problems and is not conducive to the construction and development of highway subgrade engineering. The occurrence of diseases is directly related to the quality of highway roadbed construction. Designers need to effectively cooperate with various construction techniques, materials, etc. to improve the feasibility of the design scheme when carrying out engineering project design. Afterwards, detailed calculations and verification are required to ensure that the design scheme meets the requirements. In fact, when carrying out relevant work, the design unit lacks specific investigation of the construction situation of the highway subgrade engineering site, and lacks the impact on the geological conditions and natural environment of the construction, resulting in the design scheme not being in line with the actual situation on site, which is easy to bury quality hazards and cause disease problems.

## 2.2 Objective conditions

China has a vast territory, and there are significant differences in construction conditions and environment among highway subgrade engineering projects in different regions, especially in the terrain and climate of the north and south regions. Once problems arise during construction, the quality of project construction will be fundamentally reduced. Regarding the highway subgrade engineering project For the diseases produced in, there is a great correlation with the regional conditions and natural environment. For example, most of the highway subgrade diseases in the western region will be affected by frozen soil, Karst Plateau landform, etc., resulting in subgrade damage. The loess region in the middle is vulnerable to rainfall, resulting in subgrade subsidence, landslide and other diseases, which will greatly affect the performance of the highway subgrade structure, reducing its safety and stability. Although most construction units utilize diverse technical methods during the design and construction stages of engineering projects to improve the quality of highway roadbed construction, reduce problems, and effectively control risks. However, under the influence of objective conditions, the softening and subsidence of the roadbed will continue to accelerate, and displacement problems will also occur, affecting the load capacity of the highway roadbed, and there may even be the possibility of changing the shape of the roadbed.

## 2.3 Vertical Comparison of PWDs' Employment

### 2.3.1 Quantity of Employed PWDs

According to the data of China Statistical Yearbook on the Work for Persons with Disabilities, in 2018, there were 282,631 employed PWDs in Liaoning, accounting for 2.98% of the nationwide, and 26.71% of the total quantity of registered PWDs in Liaoning. In 2019, 250,369 PWDs were employed in Liaoning, accounting for 2.93% of the nationwide employed PWDs and 23.16% of the regional registered PWDs. In 2020, the quantity of employed PWDs in Liaoning is 240,946 persons, accounting for 2.80% of the nationwide employed PWDs and 21.99% of the local registered PWDs. In 2021, the employed PWDs in Liaoning was 249,534, accounting for 2.83% of the nationwide employed PWDs and 22.83% of the total quantity of registered PWDs in the region.

### 2.3.2 Employment Types for PWDs

From the overall situation, from 2018 to 2021, Liaoning had the largest quantity of registered PWDs engaged in agricultural planting, husbandry and processing, employed through quoto scheme and flexible employment followed. The second largest quantity is employed through PWDs-oriented post and self-employed. The quantity of employed through welfare post and assistive employment is relatively small, and the detailed quantities of different employment types are shown in Table 2. Compared with 2018, affected by the COVID-19, the quantities of all PWDs' employment types in Liaoning declined to varying degrees from 2019 to 2020, and began to turn around in 2021, with the quantity of employed PWDs in four types, employed through quoto scheme, self-employed, flexible employment, and rural cultivation and addition, recovering and rising slightly.

## 3. COMMON DISEASES IN HIGHWAY SUBGRADE ENGINEERING

A good innovation atmosphere allows employees to feel the organization's support for innovation, making them willing to incorporate innovation into their work, and exert a subtle influence on innovative thinking and behavior. Under the influence of this atmosphere, employees will gradually strengthen their willingness to innovate and try to use new ways to solve problems. Through long-term accumulation, the atmosphere of supporting innovation in the organization can promote the generation of organizational innovation culture, and then have a longer-term and stable impact on the organization and its members. In addition to the necessary support of material resources and human resources, organizational innovation needs an atmosphere that encourages innovation. Only by creating and cultivating a good atmosphere that supports and encourages innovation within the organization can it stimulate the inner creative motivation of organizational members, encourage them to practice bravely, and finally achieve the goal of systematic innovation. In recent years, the study of organizational innovation climate has become a research hotspot in the field of organizational behavior, because innovation climate helps to promote employees' innovative behavior and is a catalyst for innovative behavior. Therefore, research on the influence of organizational climate on individual innovation has attracted the attention of scholars at home and abroad. After a long period of research, scholars have achieved certain research results and enriched the literature in related fields.

According to the China Statistical Yearbook on the Work for Persons with Disabilities (2018- 2022) , the quantity of registered PWDs in Liaoning increased from 1,088,225 to 1,1093,227 from 2018 to 2021 (see Table 1), and the

annual growth rates were 2.17%, 1.33% and -0.21%. From the perspective of gender, from 2018 to 2021, the ratio of male and female PWDs in Liaoning basically remained at a stable state of 1.6:1. From the perspective of registered permanent residence, the ratio of rural and urban PWDs remained at 1.3:1. In 2021, there are 664,615 male registered PWDs and 428,612 female registered PWDs in Liaoning. Compared with 2020, the quantity of male registered PWDs has decreased by 0.44% and the quantity of female registered PWDs has increased by 0.14%. There are 616,682 PWDs in rural areas and 476,545 in urban, which has a decrease of 0.41 percent and an increase of 0.04 percent respectively compared with 2020.

**Table 1:** The quantity of registered PWDs in Liaoning

Year	Registered Persons (person)	Gender		Registered Permanent Residence	
		Male (person)	Female (person)	Rural (person)	Urban (person)
2018	1058225	649599	408626	592520	465705
2019	1081178	660927	420251	604882	476296
2020	1095550	667525	428025	619212	476338
2021	1093227	664615	428612	616682	476545

### 3.1 Roadbed deformation

The problem of roadbed deformation is quite common in the current construction of highway roadbed engineering. It not only affects the stability of the roadbed structure, but also affects the aesthetics of highway traffic. In the process of the development of China's highway transportation industry, the direction of overpasses on highways is facing a severe traffic situation. However, roadbed settlement problems often occur, which can easily cause sudden vertical settlement on the surface of the roadbed, causing significant damage to highway roadbed engineering projects and affecting the normal operation of highway traffic. The main reason for the deformation problem of the roadbed is the settlement and shrinkage problem of the roadbed itself, as well as the weak bearing capacity of the natural ground in some roadbed areas. Under the load of a large number of vehicles, the structure of the highway roadbed will be greatly compressed, causing the roadbed to sink and compress, affecting the normal passage of vehicles.

### 3.2 Roadbed sliding

The problem of roadbed sliding is common in the construction of highway roadbed engineering in remote mountainous areas, mainly due to the large overall slope of the mountain slope, which can easily generate a large amount of water at the bottom of the roadbed, leading to sliding problems. If the construction unit fails to take corresponding measures to address the problem of water accumulation in a timely manner when implementing construction management for engineering projects, it is easy to induce roadbed displacement. The situation has led to the destruction of the stability of the roadbed structure. Designers may have incomplete designs and lack attention to construction standards during the early stages of the project, which can lead to many misunderstandings during the construction phase. It is difficult to ensure the terrain foundation of the highway roadbed, fail to meet various construction standards, and are prone to adverse phenomena.

### 3.3 Collapse and landslide

In the case of differences in soil conditions, there are also significant differences between highway roadbed construction, resulting in different problems. Roadbed collapse and landslide are a fundamental disease in highway subgrade engineering, with several different manifestations, mainly including landslides, weathering and falling, and sliding problems. The occurrence of landslide phenomenon is due to the sliding of soil along a certain sliding body under the effect of gravity, and it is also affected by groundwater during construction, resulting in the shear resistance of the internal soil not meeting the requirements and continuously decreasing, affecting the overall stability. The construction environment of highway roadbed engineering is mostly harsh. Although the construction unit can take relevant measures to adjust the construction form of the project, the roadbed will still be exposed to external space for a long time, causing the construction of the project to be damaged by the natural environment, resulting in large-scale detachment. When weathering and falling occur on highway embankments, it can to some extent hinder the normal operation of traffic. The sliding problem is a landslide phenomenon caused by some soil masses in one direction. The main reason for this problem is the sliding problem of the slope caused by flowing water erosion, which leads to the construction quality not meeting the requirements.



### 3.4 Early damage

According to the majority of highway roadbed construction materials are concrete, and construction personnel need to use technical methods such as paving and rolling to complete the corresponding construction tasks of the project. When implementing these operations during the construction phase, the construction unit did not effectively control the overall construction quality, especially in terms of temperature management of asphalt mixtures, which resulted in lateral cracks and early damage. Some construction personnel did not consider the comprehensive strength and durability of the highway roadbed structure, resulting in unnecessary damage. In addition, when natural environmental changes occur in the construction site, it is difficult for construction personnel to respond promptly, which can also lead to structural damage issues.

### 3.5 Uneven road surface

After completing the construction operation, highway subgrade engineering needs to be put into operation to provide convenience for people's passage and ensure the stability and safety of road traffic operation. For the current stage of engineering project construction, if the construction methods used by the construction unit do not meet the standard requirements, it will cause uneven road surfaces, form construction diseases in highway subgrade engineering, and reduce the overall quality level of construction. If the mixture used by construction personnel contains a large amount of oil and stones, it will cause bulging problems. Once the reasonable requirements are not met when using the mixture, it will also reduce the overall quality of construction. Some construction units experience uneven mixing of the mixture during operation. The phenomenon can affect the effectiveness of asphalt use and form diseases that are difficult to treat in a short period of time.

## 4. TECHNICAL MEASURES FOR DISEASE PREVENTION AND CONTROL OF HIGHWAY ROADBED ENGINEERING

The post COVID-19 era refers to the new situation faced by mankind after the COVID-19 has been effectively controlled. As China's economy enters a stage of high-quality development, competition in the labor market is intensifying. As a member of society, the employment of PWDs is directly related to the guarantee that they can participate in social life on an equal footing and share the material and spiritual achievements of society. Domestic and foreign scholars have done a lot of research on the employment of PWDs. Yuan et al.(2021) used the spatial econometric model, Theil index and spatial autocorrelation analysis to conduct a comprehensive assessment of the spatial distribution characteristics of employment development of PWDs in China from 2011 to 2017 [1]. Alajlan (2023) uses ethnographic qualitative research methods to explore the employment of PWDs in private enterprises in Saudi Arabia [2]. Morris (2023) studied the impact of remote employment on the employment prospects of PWDs in developing countries in the post COVID-19 era [3]. These articles provide methods and experience for this paper to carry out regional research on the employment of PWDs.

In order to comprehensively understand the situation of PWDs in Liaoning, a horizontal comparison was also made with 31 regions in China (see Figure 1, due to statistical limitations, the data did not include Hong Kong, Macao and Taiwan). By 2021, Judging from the whole trend of registered person, the total quantity of registered PWDs in Liaoning (1,093,227 persons) accounted for 2.87% of the nationwide (3,80,049,193 persons), 1,858,773 fewer than Henan, which has the largest quantity of registered PWDs, and 980,385 more than Tibet, which has the smallest quantity. Henan accounted for 7.76% of the nationwide, and Tibet accounted for 0.3%. In addition, from the perspective of disability category, the quantity curves of registered male, female and rural PWDs in all regions of China are consistent with the trend of registered PWDs curve, while the quantity curve of urban PWDs is slightly different. However, the quantity of urban PWDs in Liaoning is stable, is not the cause of this phenomenon. To sum up, it is not difficult to find that the total quantity and each type distribution of registered PWDs in Liaoning is similar to that of most regions in China, and the quantity of PWDs in Liaoning is in the middle level of the nationwide.

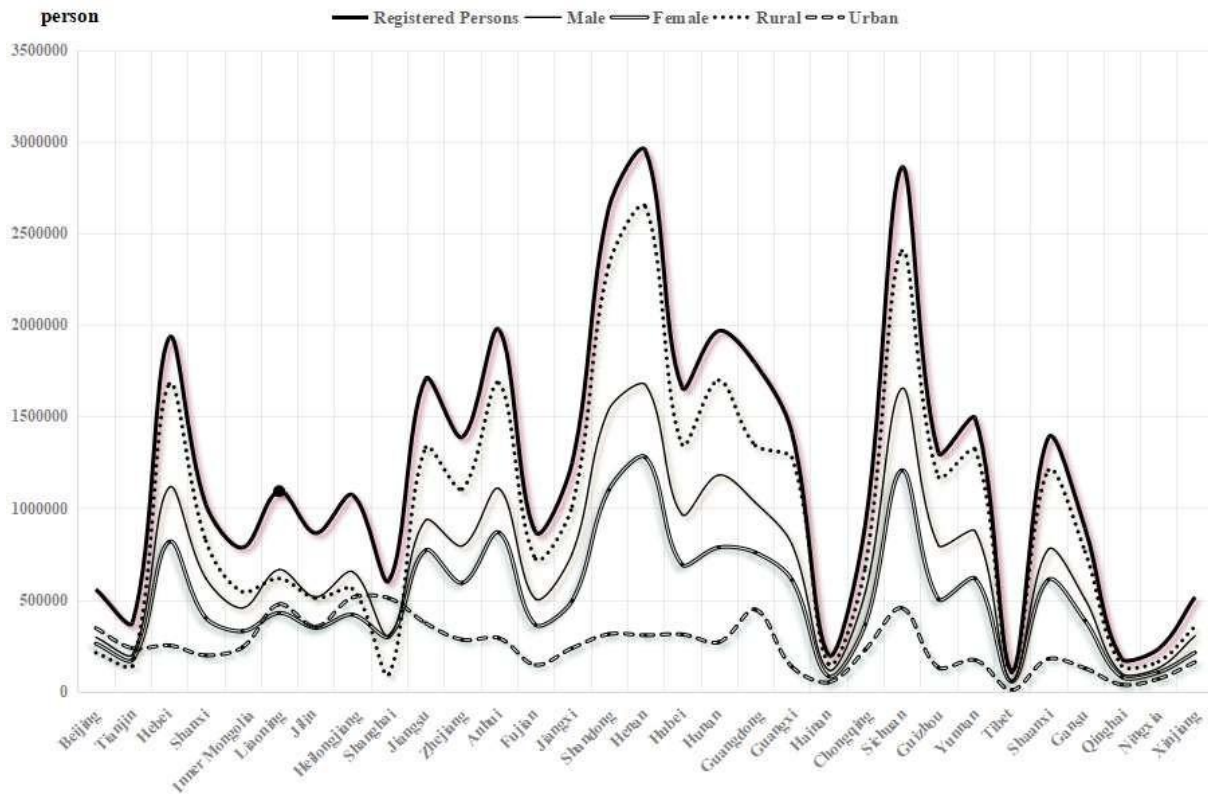


Figure 1: Comparison of the registered PWDs' quantity in China (2021)

#### 4.1 Optimize engineering design

Engineering design is a crucial part of the construction management of highway subgrade engineering, which is easily overlooked by staff and can lead to disease problems in later practical operations. When carrying out specific disease prevention and control work in highway subgrade engineering, it is possible to start from the optimization of engineering design, and comprehensively formulate reasonable engineering construction and construction standards based on the characteristics of the construction area and the development of economic conditions of the engineering project, in order to reduce potential problems in actual operation. The work in the design stage not only requires the participation of designers, but also requires the construction and management personnel to adjust the content of the engineering design plan that does not meet the actual situation based on their own work experience. When planning the highway engineering structure, the design unit should consider contemporary factors such as topography, topography, and hydrological conditions to select the most appropriate type and thickness of surface layer. It is also necessary to develop a solution plan for potential natural environmental changes in the region, and prevent and control diseases from multiple aspects. There are practical deviations in the construction and actual operation of different highway subgrade projects. When optimizing engineering design, it is necessary to make drainage planning, check the moisture content of the subgrade, and ensure that its strength can meet the requirements. Finally, it is necessary to avoid adverse effects on project design caused by financial issues during the organization and construction of construction units.

#### 4.2 Deformation prevention and control technology

The damage caused by roadbed deformation to highway engineering structures is very significant. When adopting deformation prevention and control technology, construction personnel should clarify the reasons for roadbed deformation, conduct reasonable analysis of the external environmental impact on the slope, and improve the overall construction effectiveness of the project. The deformation problems generated in the construction of highway subgrade mainly include displacement, inclination, etc. When dealing with this disease problem, construction personnel should adhere to the principle of adapting to local conditions and adopt scientific prevention and control technologies based on local specific conditions to reduce the gap between the actual application and expected results of the technology. Therefore, before implementing specific technical operations, construction personnel should be familiar with the local basic situation and use targeted protection techniques to

solve the problem of roadbed deformation. When collapse or landslide occurs in highway roadbed engineering due to physical conditions, construction personnel can use retaining walls and grouting technology to alleviate the damage to the roadbed, so that it can be effectively controlled and not quickly damage traffic. In response to the problem of landslides on unfavorable geological conditions, it is necessary to use highly adaptable technical forms and ensure that the engineering construction technology is relatively simple to operate in order to ensure the long-term stability of the slope and meet the requirements for disease prevention and control of the foundation.

Employment is the basis for persons with disabilities (PWDs) to improve their living conditions, improve their social status and participate in social activities, and is the key to realize their life value. Based on the statistical analysis method and relevant data from China Statistical Yearbook on the Work for Persons with Disabilities (2018-2022) and China Disabled Persons' Federation (CDPF), this paper analyzes the employment situation and problems of PWDs in Liaoning in recent years, focusing on the quantity, employment type, employment rate and changes of PWDs. The study found that despite the impact of the COVID-19 epidemic, the employment of PWDs in Liaoning has recovered and experienced a small increase since 2021. However, there are some phenomena in the employment process of PWDs, such as generally low level of education, high proportion of surplus working-age population, employment growth point mainly focusing on self-employed and flexible employment, decline in the number of training for PWDs and unstable fluctuation of funding investment. From the perspective of individual and social factors, some countermeasures and suggestions are put forward to promote the employment of PWDs in Liaoning.

#### **4.3 Landslide prevention and control technology**

Landslide prevention and control technology is quite common in the current construction of highway subgrade engineering. Construction personnel need to improve the stability of the slope as the foundation, and adopt such technical means to achieve the expected goals of engineering construction. In terms of the current development of the highway transportation industry, common slope prevention and control measures. There are two main technical methods: engineering support and plant protection, among which plant protection is relatively more widely used. Engineering protection mainly improves the stability and safety of slopes by setting protective piles or anchor rods and other protective components in the roadbed structure. Plant protection, as the name suggests, requires the cultivation of trees on slopes, which can alleviate the impact of water flow on the roadbed in relevant areas. At the same time, it can also play a role in beautifying the ecology in combination with the coordinated development of China's modern social economy and ecological environment. Both of these prevention and control technologies can achieve good landslide prevention and control effects. Construction units can choose corresponding technical forms based on their own technical level and financial situation, and at the same time, combine local conditions and environmental analysis to analyze the feasibility of the technology, in order to improve the construction quality of the project.

#### **4.4 Prevention and control technologies for different roadbed sections**

The occurrence of diseases requires the construction unit to take timely feasible measures to control them, ensure the stability of the highway roadbed engineering structure, and create safe traffic conditions for people. There are significant differences in the prevention and control technologies that need to be used when diseases occur in different roadbed sections. If the same technical form is used uniformly, it will affect the construction quality of the engineering project and fail to achieve the expected technical results. Regarding the soil quality of debris flow, construction personnel should clarify the damage caused by roadbed structural diseases to the overall engineering project. The speed of its movement is very fast, which will impact the roadbed project in a large area in a short period of time and also bring great traffic obstacles. Construction personnel can use tree planting and terracing to reduce the impact of debris flow on the roadbed structure when preventing and controlling roadbed diseases. They can also alleviate the negative impact of the disease on the roadbed by constructing supports. At the same time, they can use interception tools such as dams to intercept and minimize the negative impact of roadbed diseases.

For loess roadbed, when it suffers from diseases, it is mainly affected by rainwater interference, resulting in damage to the original loess structure and settlement under the influence of gravity load. When adopting disease prevention and control techniques for this type of roadbed, construction personnel should master the overall attributes and architectural form of highway engineering, and strengthen the application of waterproof technology. Safe and reliable waterproof mechanisms need to be set up during construction to prevent the roadbed from being wet by water, thereby improving the stability of the structure.



In the process of prevention and control of karst roadbed, it is necessary to comprehensively understand the geological conditions. Clarify the distribution and development patterns of karst geology based on actual conditions, allowing construction personnel to adopt targeted treatment measures based on specific disease levels. In terms of the current prevention and control of roadbed diseases in China, most of the karst ground prevention and control require less difficult technical operations as the foundation, and do a good job in guiding karst water to promote the smooth progress of roadbed construction.

In the process of prevention and control, corresponding prevention and control plans should be proposed for the roadbed of the stepped on empty road section, familiar with the operation situation of the stepped on empty area, and also grasp the internal layout. The foundation conditions in this area are easily affected by external environmental interference, resulting in roadbed settlement issues. Construction personnel can effectively control it using methods such as backfilling, bridge spans, or grouting. They can also use cement sand and gravel filling to ensure the integrity of the roadbed structure and avoid negative effects caused by surface settlement. When carrying out mining operations in this area, corresponding coordination work needs to be done, and construction personnel need to control the joint width of the road slab, improve the smoothness of the roadbed, and prevent deformation problems.

## 5. CONCLUSION

The prevention and control of highway roadbed engineering requires construction personnel to master accurate construction techniques for engineering projects, and adopt differentiated technical methods based on different highway roadbed properties. In the actual prevention and control process, it is necessary to understand the characteristics of roadbed diseases and the damage they cause, refine the construction process of the project, and strengthen the overall order of operation. When implementing corresponding operations, construction personnel should cooperate with each other, conduct scientific analysis on the existing disease problems, and strive to extend the service life of highway roadbed structures, create a good highway traffic environment, and contribute to the development of modern society and economy.

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