Journal of Theory and Practice of Engineering Science ISSN: 2790-1505
DOI: 10.53469/jtpes.2023.03(08).03

Winter Construction Measures for Roadbed

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Abstract: ***In recent years, China has made obvious achievements in roadbed construction, which cannot be separated from the efforts of relevant staff. China has completed the construction of many modern roadbed roads, and there have been many advancements in related roadbed construction technologies. This not only strengthens communication between different regions, improves the convenience of people's daily travel, but also further narrows the gap between China and other developed countries. However, there are still many key points to face when designing the roadbed, especially in the construction of the roadbed and pavement, which are still worth studying. The characteristics of winter climate will have a certain impact on roadbed construction. For this purpose, specific construction measures for winter roadbed construction will be explored to ensure the quality of roadbed construction in winter, for reference. The use of social network analysis in tourism planning is becoming increasingly popular and is expected to continue to grow in the coming years. As social media continues to play a significant role in the tourism industry, tourism planners are recognizing the value of leveraging social network analysis to gain insights into the preferences and behaviors of tourists.***

Keywords: roadbed; Winter construction; Specific measures; Related research.

1. INTRODUCTION

In recent years, China's roadbed construction has made significant progress and development. However, there is still room for improvement in the construction of roadbed and pavement. Especially influenced by the outdoor climate in winter, the decrease in temperature causes certain physical changes, making winter roadbed construction more difficult compared to before. Due to objective material and environmental changes, the measures for winter roadbed construction are different from other seasons. Therefore, how to design a more scientific and reasonable roadbed construction plan, further improve the problems that may occur during winter construction of the roadbed, enhance the service life of the roadbed engineering, and improve the safety and stability of the roadbed engineering has become the focus that relevant construction personnel need to pay attention to at this stage.

During the specific construction process of the roadbed, several key points that need to be paid attention to are the safety of the project, the service life of the roadbed, and the durability of the roadbed. Among these key points, the problems that arise during the construction process will directly affect them and affect their future usage. Due to the average temperature of around -4 ℃ throughout the day in winter, temperature has become the primary challenge for winter roadbed construction. Due to the high moisture content in the soil, the volume of water increases after freezing, causing concrete to swell and potentially causing compaction and cracking problems. After the temperature rises, the frozen soil begins to melt, which may cause subsidence problems. Therefore, when constructing the roadbed, it is necessary to further improve the relevant construction techniques to reduce safety issues caused by concrete cracks and subsidence. Continuously improving the construction plan of the roadbed to meet the requirements of safety and durability is a prerequisite to ensure that each construction link of the roadbed plays its role in use. Relevant construction personnel need to ensure the normal operation of the engineering safety system. They need to be comprehensive in material selection and detail enhancement, prevent roadbed subsidence, analyze the main reasons for subsidence, and truly solve the problems that exist in the project.

2. MAIN CAUSES OF ROADBED COLLAPSE AND SETTLEMENT

The application of multi-source data fusion and intelligent analysis technology is an important development trend in social network analysis for tourism planning. By integrating data from multiple sources, such as social media, location data, weather data, and transportation data, social network analysis can provide more accurate and personalized recommendations for tourists, enhancing the accuracy and personalization of tourism planning.

For example, by combining social media data with location data, tourism planners can gain insights into tourists' movements and activities, enabling them to design more effective and efficient tourism routes and activities. Similarly, by analyzing weather data, tourism planners can adjust tourism products and services according to the

weather conditions, providing tourists with a more comfortable and enjoyable travel experience.

Intelligent analysis technology, such as machine learning and artificial intelligence, can also be used to analyze and interpret multi-source data, providing more accurate and personalized recommendations for tourists. For instance, machine learning algorithms can be used to predict tourist preferences and behavior patterns based on their historical data, enabling tourism planners to provide more targeted and personalized recommendations for tourism products and services.

Overall, the application of multi-source data fusion and intelligent analysis technology is expected to enhance the accuracy and personalization of tourism planning, providing more valuable and customized experiences for tourists.

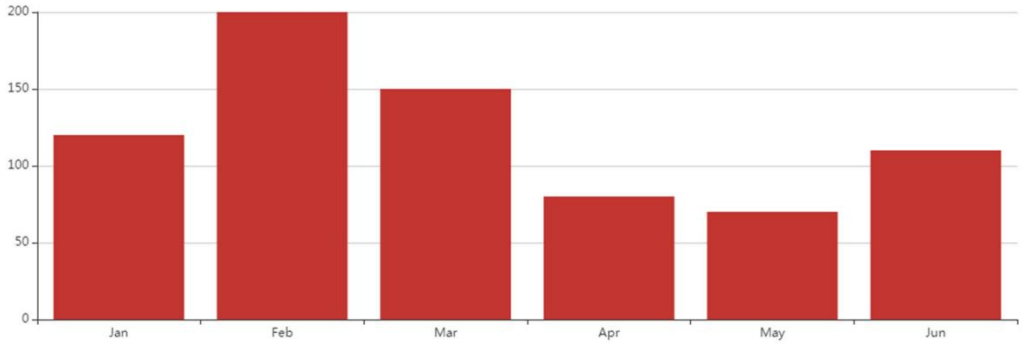

Figure 1: In this example, the x-axis represents the months of the year, and the y-axis represents the value of some data

2.1 Affected by winter embankment deformation

In the actual construction process of the roadbed, backfill materials with clay are generally used, which means that the construction process is easily affected by certain external factors, and there may be significant construction difficulties during the compaction process of the backfill soil. In addition, due to the decrease in winter temperature, the temperature will have a certain impact on the construction materials of the roadbed, and it will affect the moisture content of the concrete. The lower temperature will cause the moisture to solidify, and the temperature rise will cause the frozen soil to melt. Once the density of the material cannot meet the actual requirements of the project, and the moisture content in the soil exceeds the construction requirements, during acute compaction construction work or after being put into use, There is a high possibility of collapse, settlement, or deformation. Even though the compactness of the roadbed can be improved to a certain extent under the influence of future driving loads and the self weight of the embankment, due to the influence of winter climate, the soil softness is too strong, which still leads to certain differences between the roadbed and the road. In the short term, it may still be suitable for use, but after a long period of high-strength external forces, the road will inevitably undergo a certain degree of deformation.

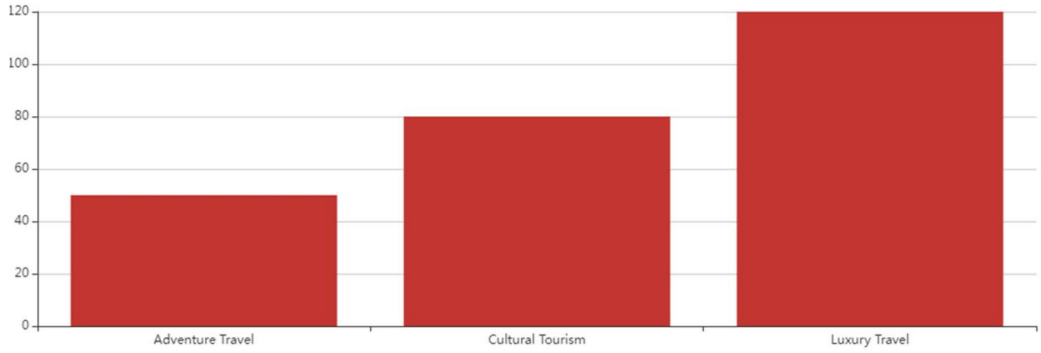

Figure 2: This bar chart represents the realization of personalized tourism planning and services using social network analysis.

2.2 Affected by deformation of the abutment foundation in winter

Since it is for roadbed construction, it is inevitable to carry out relevant work in areas with relatively complex terrain. The complex terrain can cause certain difficulties in roadbed construction, coupled with low winter temperatures and harsh environmental conditions, and even encountering problems such as heavy snow and low temperatures. If there are many gullies in the construction area, it is easy to cause deformation of the road foundation under the influence of low temperature environment. The reason why deformation occurs is precisely because the strength of the foundation itself is weak and the soil voids are large. The change in temperature leads to changes in the internal structure of the soil, and the moisture content of the foundation is too high or too low. In this construction environment, the filled roadbed is often subjected to load, which increases the possibility of deformation, and the deformation amplitude is relatively high. Therefore, relevant construction personnel need to ensure that the additional stress on the roadbed is lower than the relative bearing capacity of the foundation, and solve the problem of frozen soil layer in the first time, in order to effectively control the settlement problem and improve the overall safety of the roadbed.

2.3 Insufficient rationality of roadbed filling measures

Due to the low temperature and high moisture content of cohesive soil in winter, if the roadbed filling measures are not reasonable enough, it will lead to the problem of roadbed collapse and settlement. In specific projects, it is necessary to choose unfrozen sandy soil instead of using cohesive soil. However, some engineering parties often overlook this issue when carrying out roadbed construction projects, resulting in poor permeability of the roadbed. Once there is a sudden temperature drop in winter, the roadbed may find it difficult to adapt to extreme weather, and various problems may occur. If they cannot be solved in a short time, it will seriously affect the entire road project. The x-axis displays different travel styles, such as adventure travel, cultural tourism, and luxury travel. The y-axis displays the number of tourists interested in each travel style based on social network analysis data. The "series" object contains the actual data that will be plotted on the chart, with three values representing the number of tourists interested in each travel style.

3. REASONS FOR CRACKS IN ROADBED CONCRETE

The continuous development and application of social network analysis has the potential to facilitate the digital transformation and upgrading of the tourism industry by providing essential support and assistance.By leveraging social network analysis technology, tourism planners can gain insights into tourist behavior and preferences, enabling them to design more targeted and personalized tourism products and services.

Furthermore, social network analysis can also be used to analyze and interpret large amounts of data, such as weather data, transportation data, and accommodation data, providing valuable insights for tourism planners to optimize tourism products and services. This can lead to improved quality and efficiency of tourism products and services, enhancing the competitiveness of the tourism industry.

In addition, social network analysis can contribute to the sustainable development of the tourism industry by enabling tourism planners to design more eco-friendly and socially responsible tourism products and services. For example, by analyzing tourist behavior data, tourism planners can identify areas where sustainable tourism practices can be implemented, such as reducing waste and promoting responsible tourism activities.

In general, utilizing social network analysis in tourism planning has the potential to advance the digital transformation and upgrading of the tourism industry. This can result in enhanced quality and efficiency of tourism products and services, while also contributing to the sustainable development of the industry.

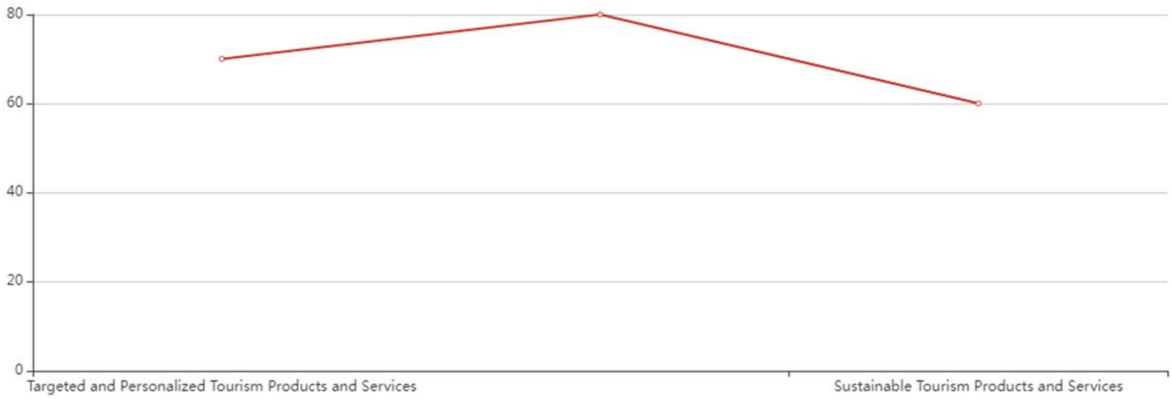

Figure 3: This line chart represents the potential benefits of social network analysis in promoting the digital transformation and upgrading of the tourism industry

3.1 Large temperature difference between the interior and exterior of the roadbed in winter

The concrete used in the roadbed often generates high heat during the shrinkage process, and due to its strong heat dissipation ability, its internal temperature will continue to rise. However, due to the low temperature in winter, the external temperature of concrete is affected by the overall climate in winter, which makes the external temperature too low, and the internal and external temperature difference of concrete is large. Under the influence of the principle of thermal expansion, higher tensile stress will be generated inside the concrete. Once the tensile stress generated inside the concrete exceeds its external bearing capacity, cracks will appear on its surface. Unlike other cracks, cracks caused by internal and external temperature differences often have no fixed pattern. The number and size of cracks depend on the size of the temperature difference in concrete, which means that traditional time limited methods cannot be used to prevent them. Instead, it is necessary to start from the root and control the temperature difference changes inside and outside the concrete. Only by controlling it within a reasonable range can effective prevention be achieved, further ensuring sufficient safety and stability of the roadbed during winter construction, and ensuring normal daily travel.

3.2 Lack of maintenance work for roadbed concrete

In winter, the outdoor temperature often drops suddenly. If the temperature inside the pit cannot be maintained above 0 ℃, it is necessary to immediately take measures to supplement and add insulation layer to prevent the roadbed concrete from freezing early. However, due to the fact that many engineering parties often overlook this measure and fail to take the correct measures to maintain the roadbed concrete, cracks will appear in the concrete under the influence of sudden temperature drops, leading to serious weakening of the roadbed safety. In addition, the mixed concrete should be immediately poured into the foundation and compacted in a timely manner. The pouring time should be effectively reduced as much as possible. Only by maintaining the temperature of the concrete above 10 ℃ after pouring can the overall structure of the roadbed be relatively stable.

In many areas with lower temperatures, once the soil particles in the construction area are finer and the soil moisture content is higher, it can lead to freezing due to low temperatures. When these soils with high water content are added to concrete for roadbed pouring, it can cause many problems. Due to the large temperature difference between day and night in winter in some areas, the concrete will appear thermal expansion. In the long run, many cracks will appear, causing serious damage to the overall quality of the subgrade. Therefore, it is necessary to carry out timely maintenance work to ensure the normal use effect.

3.3 Lack of daily weather survey records

It should be noted that the temperature environment in winter is variable, with sunny weather one day and the possibility there is snowfall and the relevant construction personnel lack daily weather investigation and recording work, the roadbed concrete is likely to be damaged to a certain extent due to weather and temperature reasons. The roadbed concrete is significantly affected by temperature, and it is necessary to enhance the strength of the roadbed

concrete based on temperature changes. Due to insufficient awareness, some engineering parties were unable to grasp the temperature changes in advance, making it difficult to timely grasp and control potential problems in the event of a sudden temperature drop, ultimately affecting the entire roadbed project.

In addition, developing relevant construction plans is an essential part of winter roadbed construction. The construction plan needs to consider various construction conditions, and weather temperature is the key part that needs to be paid attention to in the plan. The primary difficulty in roadbed construction in winter is the difficulty in grasping the weather conditions, so relevant personnel need to keep track of the recent weather conditions. Even though there may be some errors between the weather forecast and the actual weather conditions, directly ignoring the investigation records of the weather will result in greater operational difficulty than the occurrence of weather errors.

4. SPECIFIC MEASURES FOR WINTER CONSTRUCTION OF ROADBED

The construction of the roadbed is carried out in winter, whether it is for excavation, filling, or masonry construction, it is necessary to consider factors such as temperature and weather. Relevant staff need to develop a detailed and reasonable construction plan based on daily climate conditions, clarify the specific construction process, and plan and formulate various construction details in detail to ensure that each staff member can clearly understand the specific content of the plan. In addition, during the specific implementation process, it is necessary to always grasp the use methods and storage conditions of roadbed concrete, in order to ensure that the roadbed construction can proceed reasonably in winter.

4.1 Construction Measures for Winter Roadbed Excavation

Before conducting roadbed excavation construction, it is necessary to comprehensively investigate the construction area and clarify the actual conditions of the ground and underground soil around the roadbed. Once adverse conditions such as permafrost layer are found that affect normal construction work, they need to be thoroughly cleaned up as soon as possible. Once they meet the actual construction conditions, the next step of work can be carried out. If the cleaning of the surface of the frozen soil layer is not timely enough to carry out relevant roadbed construction work in the first time, it is necessary to further cover the cleaned ground to prevent further freezing due to low winter temperatures and ensure smooth roadbed excavation construction.

Before carrying out roadbed excavation construction, it is necessary to select the most appropriate excavation method based on the actual freezing degree. If the soil layer freezes slightly and the frozen soil has not yet reached a thicker level, manual excavation can be chosen. However, if the permafrost layer is thick and the degree of freezing is deep, excavation equipment needs to be selected for excavation work. If necessary, methods such as blasting and defrosting need to be used to ensure the smooth progress of roadbed excavation work. In addition, try to choose sunny weather for excavation work and minimize the construction difficulty as much as possible. When excavating, face the positive side and carry out excavation work on the negative side after the weather is relatively warm.

In addition, it is also necessary to ensure the continuity of excavation work, and to ensure that the entire process of excavation for fixed road sections is completed in one go. This is to prevent extreme weather changes caused by midway pauses, which may cause the newly excavated soil layer to be frozen again. If it is necessary to pause midway due to unavoidable impacts during the normal excavation process, it is necessary to cover the excavation section, reduce freezing conditions, and minimize the difficulty of excavation construction as much as possible. The excavation of the roadbed slope in winter cannot be directly excavated to the design line position, in order to prevent inaccurate excavation dimensions caused by the shrinkage of the soil layer system due to the warming weather. Therefore, it is necessary to reserve it to the design line thickness of about 30cm, after the weather warms up and the temperature rises, the slope will be trimmed to the design line, Location of. At the same time, a thickness of about 1cm needs to be reserved at the bottom of the excavation, and a drainage ditch needs to be excavated until the weather returns and the temperature will rise before continuing to excavate it to the roadbed.

4.2 Construction Measures for Winter Roadbed Filling

The winter roadbed filling work needs to adopt a method that fits the cross-section and is layered and flat. Due to the high moisture content of cohesive soil in winter, it is necessary to choose unfrozen sandy soil or soil mixed with crushed stones to further maintain the permeability of the filled roadbed as much as possible. In addition, the thickness of each floor of the building needs to be smaller than the thickness during construction in other seasons, with a difference of approximately 30cm. The thickness of each building on each side of each floor should exceed the normal specified thickness, which is about 30-50cm. After the weather warms up and the temperature rises, all excess parts should be sorted out in the next step, and reinforced and compacted on this basis. In addition, due to significant temperature changes in winter, the soil layer is prone to repeated thawing and freezing. Therefore, the specific construction process requires excavation and filling, and timely compaction work. Each link mentioned above needs to be closely connected and connected to each other, and there must be no interruption. It is also necessary to ensure that all links are completed before the soil layer freezes to ensure that the building quality can achieve the desired effect. The concrete used should be well preserved to prevent cracks and other situations caused by winter temperature. It is necessary to ensure that the quality of the concrete meets the standards for roadbed filling construction. Only by controlling all materials under good and suitable usage conditions can the entire roadbed filling construction project be ensured to be sufficiently reasonable, laying a good foundation for the safety and stability of the roadbed, preventing problems that are difficult to prevent and solve in future use, and effectively reducing economic losses.

4.3 Construction Measures for Winter Roadbed Masonry

The construction of roadbed masonry in winter is more difficult than other seasons, so it is necessary to grasp many detailed issues well. Specifically, it is necessary to keep the blocks used clean and dry enough; Ensure that the temperature of the mortar used is controlled within the normal range, and ensure that the stone temperature is not lower than the mortar temperature, and the temperature difference needs to be controlled at around 20 ℃. To ensure that the texture of the lime paste used is relatively uniform, once the lime paste clumps or freezes, it needs to be stirred and thawed. When conducting masonry, it is necessary to use mortar prepared with silicate salt water. Mortar without cement should never be used, and it should be mixed and used at any time. This is because the winter temperature is low, so it should not be stored for too long. The parts that have already been poured need to be covered and protected in a timely manner to maintain the temperature to avoid freezing due to a decrease in temperature.

5. CONCLUSION

In summary, the construction of the roadbed is closely related to the daily lives of residents. In winter, the temperature is relatively extreme and the environment is relatively harsh, which brings many difficulties to the roadbed construction process. The main problems that need to be addressed are varying degrees of roadbed collapse and settlement, as well as cracks in roadbed concrete. Therefore, relevant construction personnel need to integrate with the actual situation during the specific construction process, and fully consider from multiple perspectives and aspects when designing the construction plan. They not only need to have a clear grasp of the daily weather conditions and temperature, to ensure the smooth progress of roadbed construction work, but also to ensure sufficient safety during the actual operation in the later stage, to prevent problems such as roadbed and pavement collapse settlement and roadbed concrete cracks, Extend the service life of the roadbed as much as possible and promote the continuous improvement of the roadbed construction level.

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